THE

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APRIL, 1905.

THE LATE MR. JOSEPH SHEPHERD CARTER, F.R.C.V.S.

We regret to announce the death of Mr. Joseph Shepherd Carter F.R.C.V.S., which took place at his residence, Ash Grove, Bradford, on Saturday, March 11th. Mr. Carter, who was in his 81st year, was one of the oldest veterinary surgeons in Yorkshire, and only retired from active practice on account of failing health in June last. He had been in Bradford for more than fifty years. Before the West Riding County Council was formed he was the Chief Veterinary Inspector for the East and West Riding, and was subsequently appointed under the Contagious Diseases of Animals Act. He served for some time on the Council of the Royal College of Veterinary Surgeons, and was one of the founders and a past President of the Yorkshire Veterinary Medical Association. He took the greatest interest in all matters connected with the welfare of the profession, and was an active member of the Council of the National Veterinary Benevolent Society, and a regular attendant at the meetings of the National Veterinary Association. In his youth he was a member of the local Yeomanry, and was called out during the Chartist riots in 1848. Mr. Carter is survived by three sons and two daughters. All the former are members of the profession: Mr. G. W. Carter, of Keighley; Mr. J. H. Carter, of Burnley; and Mr. F. P. Carter, of Bradford, who succeeds to the practice.

Editorial.

HORSE AMBULANCES FOR LONDON.

It might have been thought that, in a horse-loving country like England, and a rich city like London, one of the first considerations of the authorities would have been to provide for the relief and transit of horses which might meet with unfortunate accidents in the street.

XUM

Until recently it has been no uncommon thing, even in the rich West-end of London, to see a maimed or wounded horse lying on the roadway unable to get up or be moved, for the want of an ambulance, even for so long a time as several hours. The slippery pavements, the congested traffic, and the narrowness of the streets in many places, make accidents especially frequent, and a fractured limb or a large open wound are injuries which are of daily occurrence. A philanthropic society, known as the Dumb Friends' League, have instituted efforts for the purpose of supplying this long-felt want. Money has been subscribed liberally. Five horse-ambulances are now stationed in different parts of the metropolis, and before the end of this month two others (making seven in all) will be freely placed at the service of the public. The Society is kept up by voluntary contributions and in several instances a lover of horses has stepped forward and found the whole amount (£120) with which to provide an ambulance, the only stipulation being that it should be kept up and supported out of the funds of the League. The ambulance is stationed at some well-known livery-yard or such like place, where two men and two horses are always to be found to go out immediately upon receiving a telephone message. There is no question raised as to whether the horse belongs to a poor man or a rich one, and the owner is not in any way obliged to give a donation unless he feels inclined. The ambulances are of the latest pattern, and the Society has sent experienced men to America and the Continent in order to pick up the best ideas.

The police and all veterinary surgeons are informed as soon as an ambulance is stationed in their district, and no effort is spared to let owners and stablemen know to where they may apply in an emergency.

That the necessity for such vehicles is not confined to London alone does not need suggestion, and, indeed, since horse-owners in this city have proved the value and utility of the scheme, applications have come in from other towns, notably Bournemouth, Brighton, Cheltenham, and certain crowded cities in the Midlands, and it is probable that before the end of the year at least two of the above mentioned will possess their own. Several country districts have also expressed their need, and it is hoped that the movement will shortly be extended to the North.

It is a good work, and one which merits the sympathy and support of every member of our profession.

Original Articles.

BLOOD-SUCKING FLIES AS INOCULATING AGENTS AND DISEASE DISSEMINATORS.

BY T. B. GOODALL, F.R.C.V.S., F.L.S., CHRISTCHURCH, HANTS.

THE notes in the accompanying article were written three years ago, and they are the *résumé* of a paper read before the Bournemouth Society of Natural Science. They were not published at the time owing to a difficulty in getting the illustrations reproduced, and as the whole gist of the paper is to show how the blood-sucking flies may carry disease from host to host, and act as inoculating agents, it seemed to me that the paper without the illustrations, showing what are probably the inoculating instruments of these flies, would lose much of its practical value, and hence it has been put on one side, till a casual talk with my old friend Professor Hobday induced me to send it for publication.

It will, of course, be understood that the various mouths shown are *flattened out* between a cover glass and slip, otherwise the different articles could not be shown in one picture. In use they never spread apart, but form a compact cylinder, the toothed edges of the mandibles being iu evidence on either side of the tube. Though I am aware that much has been written about flies as disease disseminators since these notes were compiled, I do not know of any distinct reference having been made to the specialisation of the mouth organs of the blood-sucking varieties as instruments of inoculation, and it is this particular feature that I wish to bring before the notice of those interested in this line of investigation.

The illustrations will explain this point better than any words.

It is thirteen years since I was privileged to read a paper at the Congress of the Sanitary Institute treating of Entomology as a Sanitary Science, and in that paper I endeavoured to demonstrate the value of a knowledge of insects and their life histories to the sanitary expert.

Since then much fresh ground has been broken in that branch of biological science that proves the relationship of the smallest known forms of life with the diseases of man and his domesticated animals; and it is now a well-established fact that disease in almost every form is the result of the invasion of a body, or some part of it, by micro-organisms or their products, the result of such invasion being dependent on the ability or otherwise of the protective agencies of the body to repel their assailants.

One object of this paper is to point out how the organisms of specific diseases may be carried from host to host by direct inoculation, the agents being blood-sucking flies.

There are many hundreds of varieties of these, but the few described here are chosen as having come under more or less extended personal examination. They are :—

(1) The Tabanus, or gad-fly of the horse and ox.

(2) The gnat (*Culex pipiens*) and mosquito.

(3) The stinger fly (*Stomoxyx calcitrans*), and its small congener (*Hematobia*).

(4) The Tsetse-fly (*Glossina morsitans*) of South Africa.
(5) The ear-fly of the horse and cattle (*Simulium reptans*).
(6) The little black midge (*Tanypus*).
(7) The common flea (*Pulex irritans*).

I will now proceed to describe the mouth of each of these in the order given, drawing particular attention to the fact that in every one of them there is a highly specialised organ which might well be styled a perfect instrument for inoculation.

The fully organised insect mouth is made up as follows:—

(1) The Labium or lower lip, which will be marked in all the illustrations LA.
(2) The Labrum or upper lip, which will be marked LB.
(3) A pair of mandibles, which will be marked MD.
(4) A pair of maxillæ, which will be marked MX.
(5) A ligula or tongue, which will be marked in all the illustrations L.
(6) A pair of palps, or feelers, which will be MP.

Nos. 1, 2, 5, and 6 have all these articles.

(Nos. 3, 4, and 7 have some of them suppressed.

1.—The Tabanus, or Gad-fly.

The gad-fly, breeze-fly, horse-fly, "stout," "cleg," &c., are all synonyms for the Tabanus.

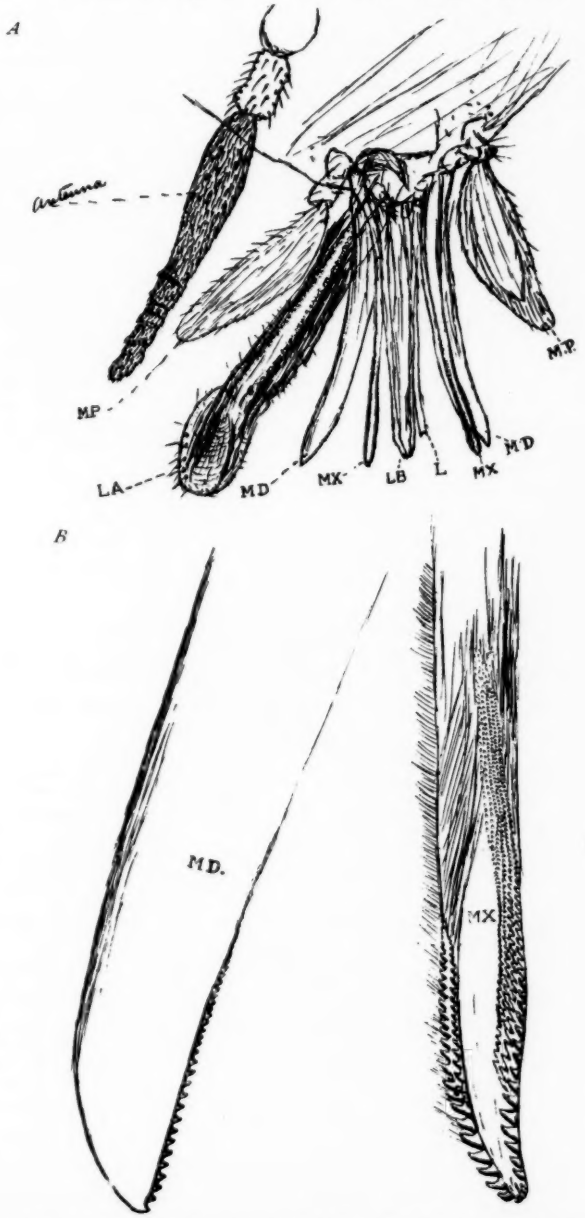
One of the most perfectly organised mouths, both for piercing the skin and for carrying blood from one animal to another, is that of the Tabanus, or gad-fly, of which there are several varieties, from the large Tabanus magnus of the ox and horse to the pretty little "cleg."

The illustration shows all the articles of a fully organised mouth. The labium, or lower lip, which in service is used as a feeler first, and then, a vacuum being formed by the withdrawal of air through the trachea, of which its extremity is largely composed, it forms a fulcrum from which the other articles can work. Opposite it is the labrum, or upper lip, immediately in the inner surface of which is the ligula, or tongue, and on either side is a pair of maxillæ and a pair of mandibles, the whole, in action, closing to form a tube; and on either side again, but outside the tube proper, are the maxillary palpi, which are probably "feelers" or organs of touch, for in action they will be seen to be constantly rising and falling, and moving first a little forwards, then backwards, and so on.

It is quite an error to think that the blood is taken up through the large fleshy-looking labium, or proboscis proper. This is merely a feeler and sheath for the other organs, and it, having selected the spot to be pierced in the victim, just fixes the apparatus there, then the mandibles, which will be seen to have a most perfect saw on one edge, cut through the skin, and it is well to bear in mind that the large Tabanus can, in an incredibly short space of time, cut through the thick hide of an ox's back; then, probably, the wound is irritated and poison introduced by the maxilla, and the blood flowing freely to repel the irritant, is taken up by the ligula and labrum.

This, at any rate, appears to me to be the method of action, as I have watched the fly at work on the back of my own hand, where I have placed them for that purpose.

I know that it was formerly said that the gnat and mosquito take



(1) Mouth organs of Hæmatopota pluvialis. Typical of the Tabanidæ.

A. Mouth organs *in situ* flattened out. *B.* Extremities of mandible and maxilla, highly magnified. *LA.* Lower lip or labium. *LB.* Upper lip or labrum. *MD.* Mandibles. *MX.* Maxillæ. *L.* Tongue or ligula. *MP.* Feelers or palps.

up the blood through the labium or proboscis, but this has been disproved, though I have not been able to see this fly at work. I have tried often enough to persuade one to take a feast from the back of my hand where I could watch her, but I have never got one in the humour to accept my invitation.

The Tabanus, when kept for some hours without food, was not so particular, and as the gnats, the Tabanus, and the midge have the full complement of insect mouth organs, we may take it for granted that they are all used in the same way.

But now look at the more enlarged drawing of a mandible and maxilla of this fly.

The mandible is made on the principle of a perfect saw—the blade being rigid and the back strengthened like the meat-saw of a butcher—but it is the maxillæ that I regard as the inoculating instrument. It is a rigid, chitonous organ, rather pointed at its extremity, and having on either side a single row of eight comparatively large recurved teeth; as they proceed backwards the teeth become smaller, but the rows increase, on one side to two rows only, but on the other to six rows of small teeth, which gradually become lost; and there may be noticed also on one side a fringe of what we should call hair, though its individual parts are very much smaller than any hair we can imagine, for the whole organ is not so large as the human hair. There is some variation in the arrangements of the hooklets on the maxillæ in the different members of the family—in the *T. major* and others, they are all round the extremity of the organ, and more numerous than in the one shown in illustration.

Imagine, then, this organ smeared with blood from an animal infected with any of the parasitic hæmatozoa, and from this going to another animal, piercing its skin and introducing its smeared maxillæ.

NOTE.—The Tabanidæ never enter houses or stables.

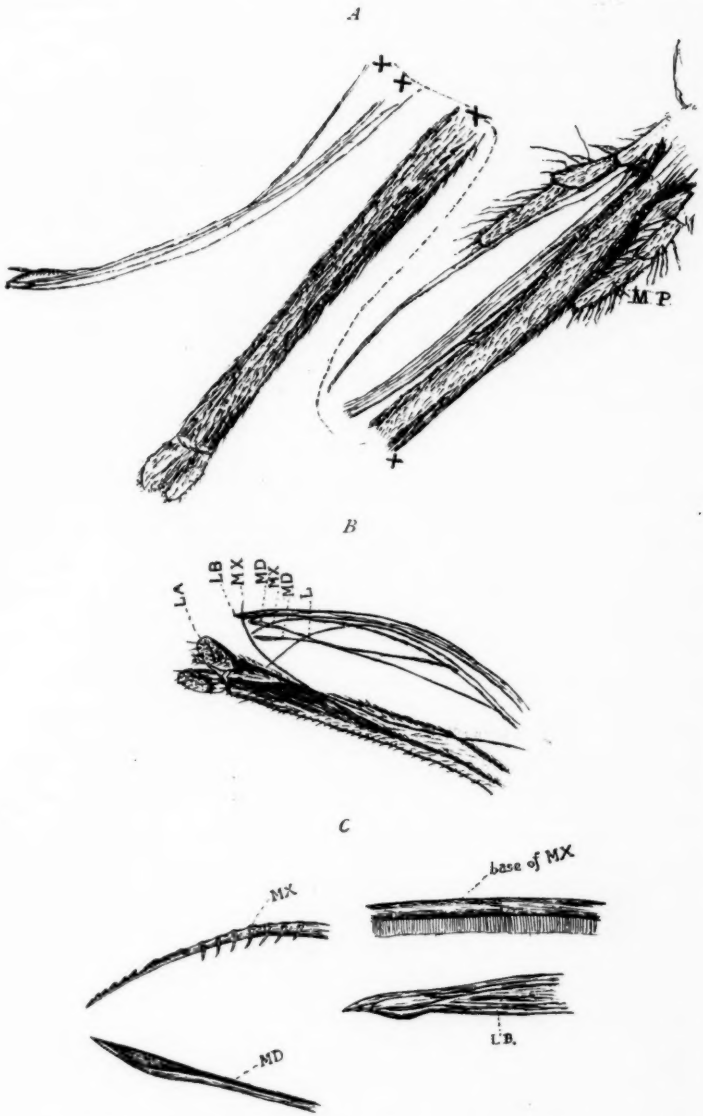
2.—THE GNAT AND MOSQUITO.

I have already made reference to the gnat or mosquito, and have pointed out the method by which it conveys the malaria parasite and other disease-inducing organisms into the circulation of man; but it might be perhaps interesting to make a closer inspection of this insect's mouth, and also make ourselves conversant with its life-history.

Note, then, that it has the full complement of the mouth organs of the typical insect.

All of them, in life, are neatly packed in the labium, or lower lip, which is carried protruded from the lower part of the head at an angle of about sixty degrees. The labrum is apparently very strong, and it is very rigid; the extremity is somewhat of the shape of a spear-head, and this is forced into the skin of its victim; the labium, being exhausted of its air, is made the fulcrum. The extremities of the mandibles are spoon-shaped, and these organs are very delicate ones indeed in the gnat and mosquito, but it is the maxillæ that are so specially organised in these insects.

The extremity has much the same conformation as that of the "sting" of the wasp; it terminates sharply, and then, gradually thickening, it shows on one of its edges some eight or nine very sharp, recurved hooklets, and following these, as the organ thickens, are



(2) Mouth organs of Culex pipiens. Typical of the gnats and mosquitos.

A. Mouth organs *in situ*. (They should be continuous where the crosses are shown.) *B*. Extremities of all the mouth organs. *C*. Extremities of mandible, maxilla, and labrum, and base of maxilla, highly magnified. *LA*. Lower lip or labium. *LB*. Upper lip or labrum. *MD*. Mandibles. *MX*. Maxillæ. *L*. Tongue or ligula. *MP*. Feelers or palps.

seven prominent spikes, and beyond these again, still proceeding towards the base of the organ, there may be noticed what appears to be a very delicate fringe of hairs, though if this term is scarcely applicable in the case of the gad-fly, it is less so in the gnat and mosquito, for in these flies the maxillæ itself is so slender that it is not visible to the naked eye! This will leave the reader to judge of the size of the articles making the fringe! These become more and more pronounced, and at the base they take the form of tracheal rings.

It is probable that the irritant material injected by the mosquito into the freshly made wounds of its victims is ejected through this tube, and is dispersed at the extremity of the organ, where an irritation is kept up by the movements of the hooklets and spikes.

A more perfect instrument than this for carrying organisms from the circulation of one animal to that of another could not be imagined.

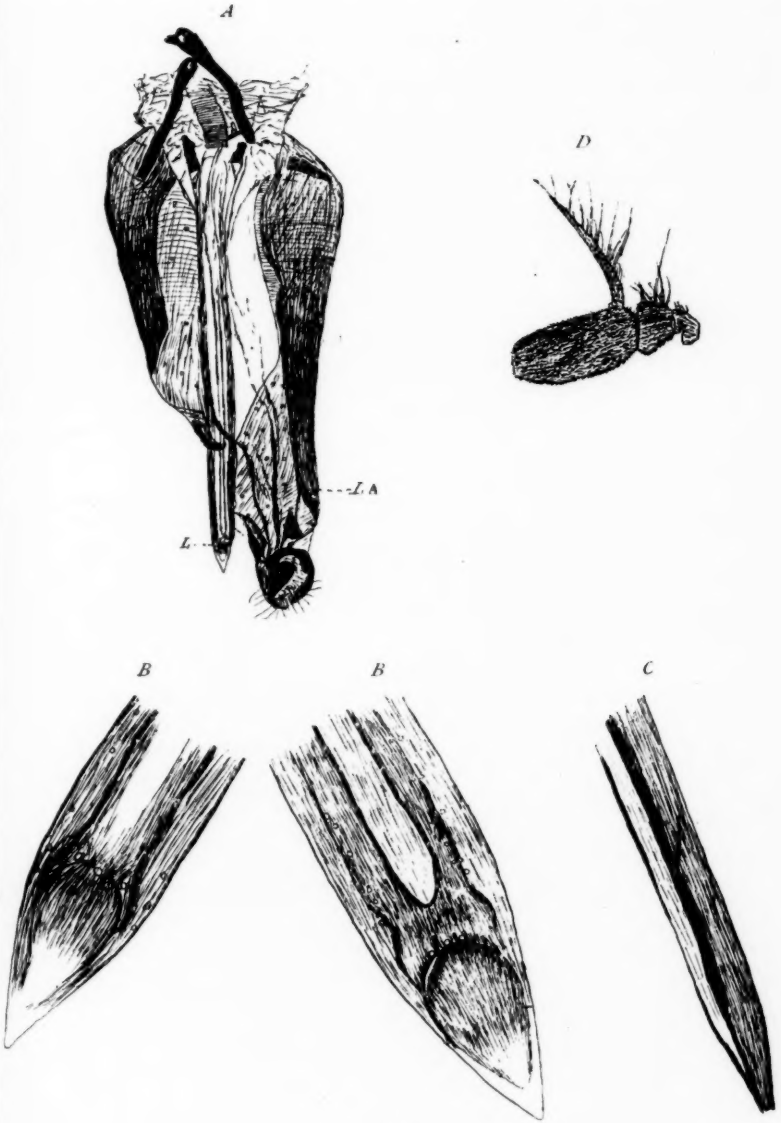
The mouth of the mosquito differs from that of the gnat in that the palps are as long as the labium or proboscis proper, and the recurved hooklets at the extremity of the maxillæ increase in size to about the sixth or seventh, and then gradually become smaller till they are lost in the edges of the hair-like fringe.

3.—The Stinger-fly, or Stomoxyx.

The Stomoxes are all much alike, and are perfect blood-suckers. and probably largely responsible for the dissemination of disease. There are several varieties of them, and it is highly probable that each variety confines itself, as a parasite, to a particular host. The one that frequents sheep-pens and sucks the blood of sheep is rather a large fly—as large again as the more common one found in houses and stables—and the one that attacks dogs is between these two as regards size. And the small one, called in "Neumann's Parasites" the Hæmatobia, insinuates itself between the hairs of the backs of the horse or cattle, for which purpose the extremity of the labium seems to be specially provided with strong bristles, which would act as a comb, and then a protected organ, which would be the special organ of touch and feeling, the labella, and in this, the piercers. This fly (the small Hæmatobia) never comes of itself into a dwelling, and if it is disturbed on the back of a horse in which it has come into the stable, it makes at once for the door.

The Stomoxyx may always be distinguished from the common house-fly (*Mus domestica*) by its proboscis, for whereas in the latter the proboscis is entirely retracted into the oral cavity when not in use, it is carried by the stomoxyx straight in front of the head in a noticeable way—this is geniculated at its base—and when it is being used for blood-sucking purposes it comes from the horizontal to the perpendicular position; and having been made into a fulcrum in the usual manner, a very sharp spear-shaped organ (probably the analogue of the ligula in the mouths of insects with the full complement of organs) pierces the skin, the other article of the mouth—the labrum —which is seen within it, being hollowed out, and when at rest it probably takes in the sharp piercing organ in the same manner as the handle of a clasp knife takes in the blade when it is closed.

But when examined with a high power lens, the inside of the extremity of this spear-shaped organ is seen to be capable of extending and contracting, and this it probably does in the act of taking in blood. There will be noticed three round orifices at the base of the spear-



(3) STOMOXYX.

A. Proboscis flattened out and showing the piercing ligula, etc. *B.* Extremity of ligula, showing pre-pharynx extended and retracted—highly magnified. *C.* Extremity of labrum, highly magnified. *D.* Antenna. *L.* Tongue or ligula. *LA.* Lower lip or labrum.

head, and these appear to lead into the tube that extends down the organ to its base, where it is continued in the form of tracheal rings to the œsophagus proper; and it can be easily demonstrated that fluids, blood or other fluid, is not drawn into the body by the fleshy proboscis, as was formerly taught, but only down the sharp piercing organ or ligula, and in passing it may be of interest to point out that there is in the proboscis of all haustellate flies a ligula through which the food in a liquid state is taken to the œsophagus, and never by the large proboscis.

Towards the base, the piercing ligula of the Stomoxyx is covered with small hairs, and a glance at the organ will show how eminently it is adapted for inoculating purposes.

The extremity of the ligula or piercer of the little Hæmatobia is more highly organised than that of the other Stomoxyx, and it is really a very wonderful organ indeed; it has, in fact, all the organs that go to make up a mouth—pharynx and œsophagus in itself—and this is so interesting that I have reproduced it in four different aspects.

A little way from the extremity is an opening in the hard chitinous edge of the organ, and behind the opening there can be seen three small lines, probably brachii; this opening leads to a heart-shaped open organ, which seems to exactly correspond to the pharynx of the larva of the same insect, and this again leads to a canal analagous to the œsophagus—this being continued to the tracheal rings at the base—but a glance at the four drawings of the extremity of this organ will show that this mimic pharynx may be raised and depressed inside the piercers, just as is any pharynx in the act of swallowing.

This, again, we must be allowed to style a most perfect inoculating instrument.

4.—Tsetse-fly.

Closely allied to the Stomoxyx is the Tsetse-fly of South Africa, (the *Glossina morsitans*), a single specimen of which I was fortunate enough to have in my possession, but which I was half afraid to dissect for the microscope for fear of spoiling.

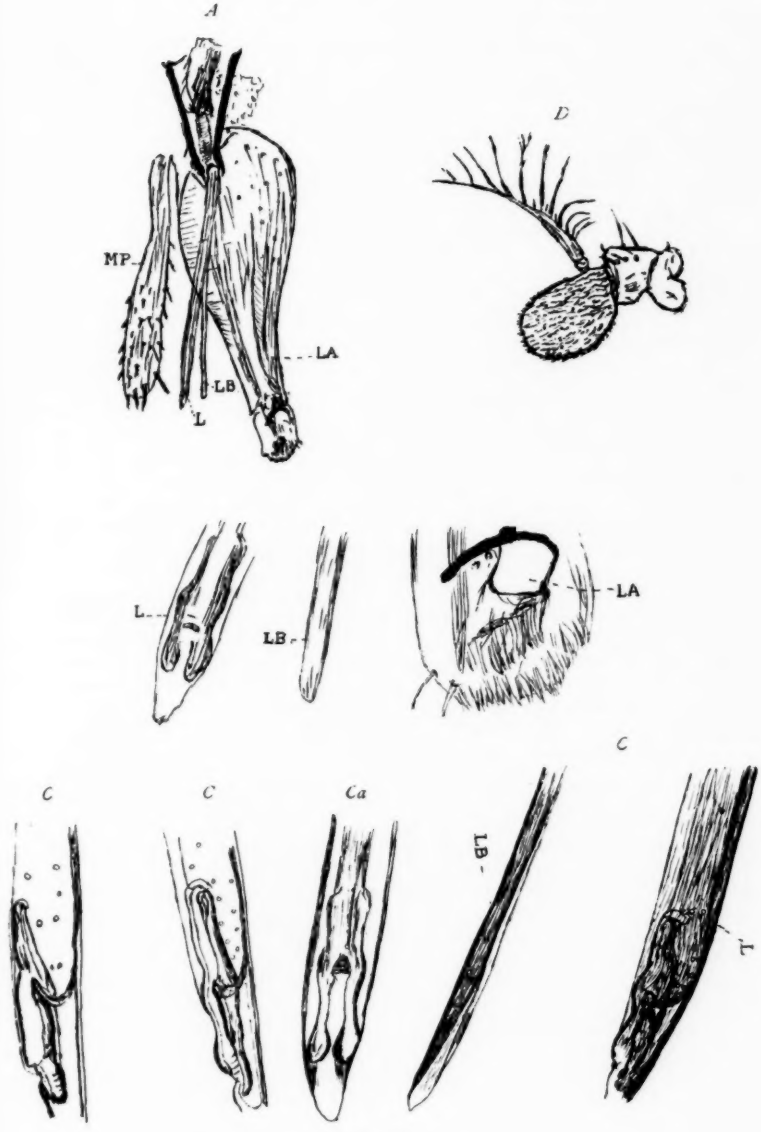
It will be seen that it has no sharply defined labrum or proboscis proper, but that the palps are enormously developed, and they probably perform the functions of the labium of our own flies.

The extremity of the very long ligula will be seen to be a very complicated organ—it is much enlarged, and at the extreme point is surrounded by a number of rasp-like plates—at the bases of which are several small recurved hooks, and at the base of each of these there is probably an opening leading to the mimic pharynx as seen in the Stomoxyx, but only having the one specimen by me I am not able to demonstrate this with the exactness of the Stomoxyx and Hœmatobia.

We must, I think, acknowledge that this wonderfully specialised ligula of the Tsetse-fly is eminently capable of being utilised as a carrier of hematozoa from the blood of one animal to that of another.

5.—Simulium, or Ear-fly of the Horse.

Anyone who has had much to do with the riding or driving of horses in damp or woody districts, must have had an experience of the annoyance they suffer from the swarms of small flies that will



HÆMATOBIA.

A. Proboscis, showing mouth organs. *B*. Extremitie of ligula, labrum, and labium, highly magnified. *C*. Extremity of the ligula, three side views, and a flattened front view (*Ca*) showing changes of position of the pre-pharynx. *D*. Antenna. *LA*. Lower lip or labium. *LB*. Upper lip or labrum. *MD*. Mandibles. *MX*. Maxillæ. *L*. Tongue or ligula. *MP*. Feelers or palps.

persistently settle in their horse's ears; indeed, in thundery weather, or in the close, cloudy weather preceding rain, these flies are a veritable plague to horses and cattle at grass, or to those in work without some kind of ear protection. In this district netted ear-caps are used, or the inner sides of the ears are smeared with a rag that has been satuarated with paraffin. They set up a good deal of irritation in the ears, which will be found studded with small punctures made by their bites, and many of the little flies are often found so distended with blood that they can scarcely fly.

This fly is the small *Simulium reptans*. It has the full complement of mouth organs, which are most beautifully adapted for the blood-sucking propensities of this miniature vampire. The insect has many of the traits and characteristics of the gnats, but its proboscis is not nearly so prominent. As a whole it is short and comparatively thick, there is no joint at its base, and it is always carried perpendicularly, the labrum or sheath is very delicate in texture, and does not seem to have the same strength or substance as the same organ in some of the other mouths we have been considering. The maxillary palpi are much developed, and have a veritable feeler in the lengthened striated last segment. The labium and the palpi, then, are specialised in this insect as "feelers," or tactile organs, and to substitute the office of fulcrum which the labium assumes in many insects, the labium of the Simulium is furnished with a pair of strong hooks, which, being insinuated into the thin skin of the lining of the ears of their victims, would hold on whilst the perfectly-toothed, somewhat rounded saws of the mandibles are making their incisions, and the highly specialised maxillæ, with their regularly disposed row of recurved teeth on either side of a hollow jaw-shaped depression, set up irritation, and became smeared with the blood from their victims, preparatory to carrying a speck of the same to the next animal on which they may alight, while around the extremities of the ligula and labrum is a fringe of soft hair. Again, we may say, a most perfect instrument for inoculation

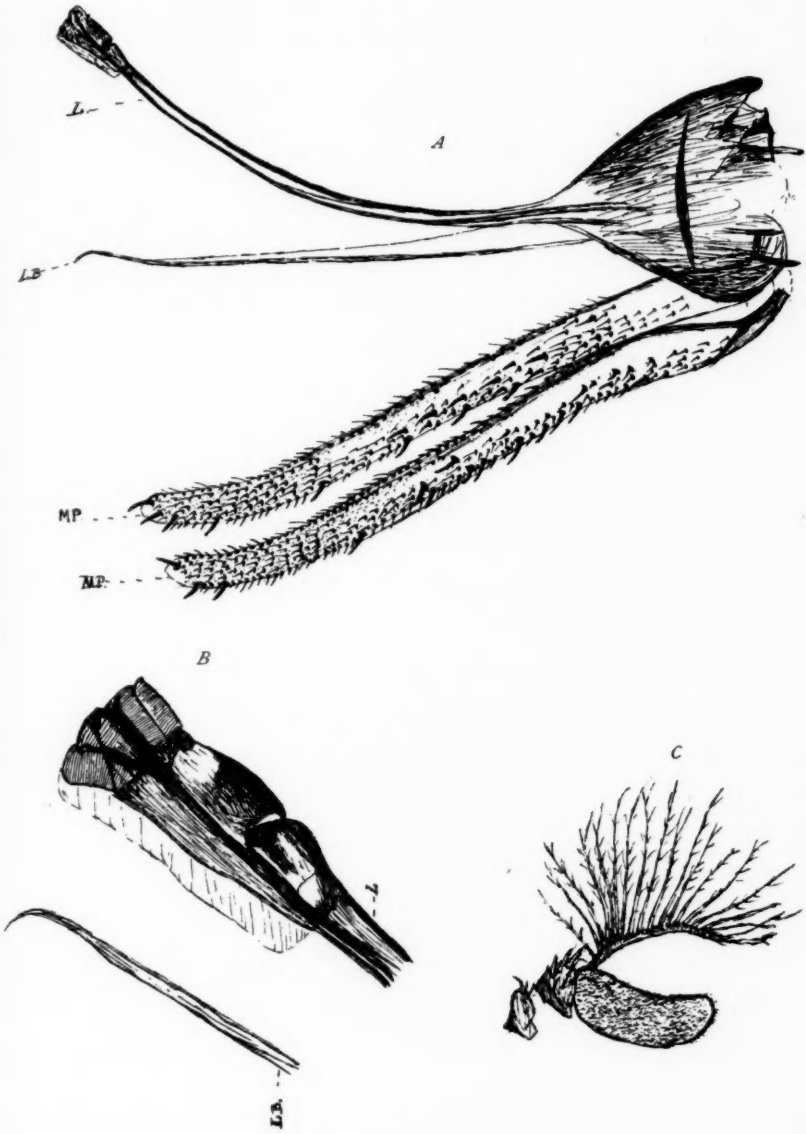
6.—The Midge, or Sand Fly—(Tanypus).

Who, when fishing by a quiet river bank, or when exercising his knowledge of horticulture on a warm summer's evening, or in other ways indulging in the quiet and rest of nature's nooks, has not felt the annoyance of the little black midges, as they are called, which intrude themselves just under the edges of one's hat, or round the wrists or ankles, just in those parts of the body where the clothing ceases to form a covering? And we know only too well the amount of irritation superseding on the bites of these most minute tormentors. Aye, and the sometimes serious consequences. And after a study of the very perfect parts of the mouth we can scarcely feel surprised at the intensity of their punishment.

Here, again, the labium is specialised more as a feeler than as a fulcrum, and the maxillary palpi and antennæ show the insect to be a near relative of the gnat.

We find here again the pair of hooks at the extremity of the labrum, a more specialised fringe of hair surrounding the extremity of the ligula, and traces of the trachea may also be seen in the illustration.

The mandible has a fourteen-toothed saw in a very rigid chitinous



(4) TSETSE-FLY (*Glossina morsitans*).

A. Mouth organs flattened out. *B*. Extremities of ligula and labrum, highly magnified. *C*. Antenna. *L*. Tongue or ligula. *LB*. Upper lip or labrum. *MP*. Feelers or palps.

foundation at its extremity only, and the maxillæ have some seventeen rather separated teeth on one edge only of their somewhat triangular shape.

This organ taken altogether strikes one as being as perfect as one could well be made for carrying a speck of blood from one victim to another.

7.—The Flea and Plague.

The plague parasite finds a congenial host in the rat, and a virulently fatal epizootic amongst these rodents is the general precursor of an outbreak of the disease in man, and quite recently it has been suggested that the flea may be the carrier of the disease-producing parasite from rat to man. (Written three years ago.)

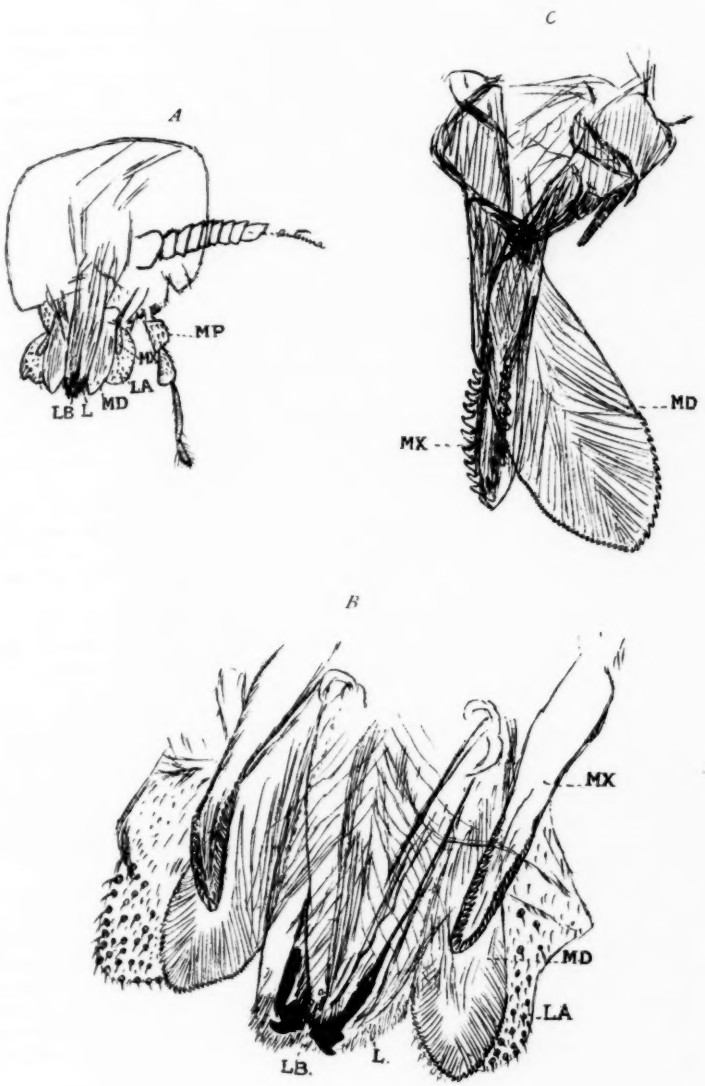
And this is probably the case, for it is a very easily demonstrated fact that the external parasites of any warm-blooded host leave their habitat immediately on the cessation of the circulation of the blood in that host. Anyone who has done a bit of rabbiting—and who, living in the country, has not? must have often noticed the rabbits covered with fleas about their ears, and how they tumble off them directly they are killed, and long before the rabbit is cold not a single flea will be found on its body. I have noticed the same thing time after time in the case of the rat and other animals, but I was never more impressed with this than during this last spring. I had occasion to destroy a mal-formed forest colt, which I did by dividing the carotids. It was literally swarming with forest flies, and I just went into the house to get a glass-top box to secure some of these for a friend, and when I came back within a couple of minutes there was not a single one to be found.

We may take it for granted that this occurs in plague-infested and flea-infested rats; directly the former parasites have caused the death of their victims, the latter ones leave their dead hosts.

But take a glance at the mouth of the flea—highly magnified; it has one or the most perfect instruments for inoculation. This has been freely introduced into the circulation of the infected rat, and immediately after its death hundreds of the fleas scuttle off each dead rodent, each flea with its mouth, fitted for inoculation, smeared with infective organisms. And the flea is not so particular in its choice of host as are most parasites. It seeks its sustenance in the first warm-blooded mammal it comes across—which is often man—introduces its smeared maxillæ into his circulation, and directly inoculates him.

8.—Nature's Inoculation.

We cannot prove, and probably have no right to assume, that any organ of any form of life is specialised in any particular way for the especial benefit of any other form of life; but we do frequently see that other forms of life take advantage of the specialised organs of a being different from themselves for their own particular advantage—*e.g.*, the tongue, saliva, and stomach of the horse do not exist primarily for the special benefit of the larvæ of the *Œstrus gastrophilus*, but for endless generations the fly has used those organs and secretions of the horse for the essentials of its life. The fly, as a matter of fact, could not exist, could not pass the phases of its remarkable life-history without the co-operation of the tongue, saliva, and stomach of the horse.



(5) SIMULIUM REPTANS.

A. Head, showing all the mouth organs. *B.* Mouth organs, more highly magnified. *C.* Extremities of mandible and maxilla. *LA.* Lower lip or labium. *LB.* Upper lip or labrum. *MD.* Mandibles. *MX.* Maxillæ. *L.* Tongue or ligula. *MP.* Feelers or palps.

And may we not, from analogy, reasonably assume that these minute pathogenic organisms have availed themselves of the remarkably specialised parts of the mouths of the blood-sucking insects for their transportation from host to host, the necessary nidus of their existence? If they had not been transferred by some such means, these organisms, which can live only in an animal body, must have ceased to exist ages ago.

It is possible that this natural inoculation is a continuous and everlasting process, and in natural circumstances may induce disease of so slight a nature as to be imperceptible; but under certain conditions—climatic, sanitary, and others—they may increase inordinately, and induce an epizootic.

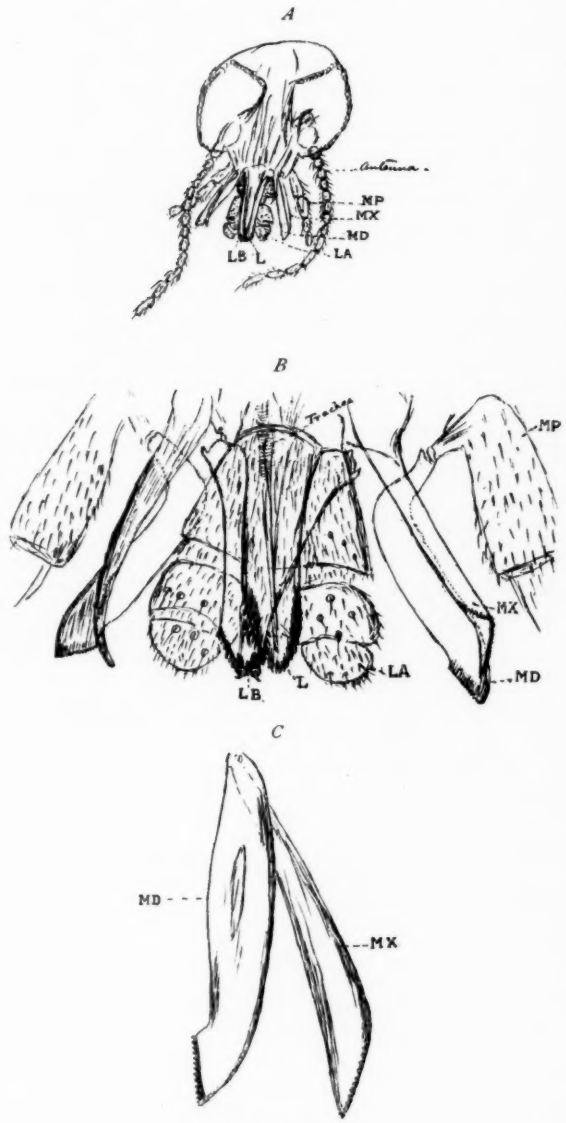
Take, for example, young stock, horses in the field, being inoculated with streptococci. Their presence does not always cause appreciable illness so long as the horses are in the fields, though there are many exceptions to this, for it is not unusual to find very bad outbreaks of strangles amongst horses that are out at grass; but as soon as these young animals are brought into the close stables of large towns the disease becomes very evident, and in these cases my point here is that these animals have probably been inoculated by flies whilst they were at grass, but under an environment where the defenisve cells of the body could keep in check the disease-inducing organisms, they have been able to offer a successful resistance; but when these animals are transferred to surroundings that weaken the resisting power of their body cells they become victims of the disease in an appreciable form.

In the great scheme of life nothing is offered or given by any one class to any other class without the prospect of some compensating advantage. The flower gives its nectar to the bee, but is paid by the fertilisation of its seeds.

Nature has an object in everything she does. There is no such thing as chance in the great works of creation, and when the blood-sucking flies take their blood from their hosts nature has some ulterior object in view beyond the mere satisfying of the appetites, and so they are endowed with these truly wonderful instruments for inoculation, and they, anticipating Pasteur by thousands of years, have been carrying on compulsory inoculation through ages of time, irrespective of governments, or creeds, or nationalities.

We are told that the native-bred horses of South Africa are proof against the Tsetse-fly disease. Is it not because they have been "salted" by nature's methods? Small quantities of blood containing trypanosoma, and often repeated, being introduced into their systems until they become immune, or rather, able to resist the pathogenic effects of the organisms in their blood, whereas one insertion of the smeared ligula of the Tsetse fly may introduce sufficient pathogenic organisms into the blood of a newly-imported horse to cause its death in a very short time.

But, besides inoculation, blood-sucking flies may carry disease in another way. They are not dependent on the blood of animals for their sustenance—in fact, many millions of them, the great majority of them, never get the chance; but they can live in the succulent matter in the locality of the medium in which they have passed their larval stages, and this is almost, if not quite, invariably in decomposing organic matter. That this may be the case I have proved, for



(6) TANYPUS.

A. Head, showing all the mouth organs. *B*. Mouth organs more highly magnified. *C*. Mandible and maxilla. *LA*. Lower lip or labium. *LB*. Upper lip or labrum. *MD*. Mandibles. *MX*. Maxillæ. *L*. Tongue or ligula. *MP*. Feelers or palps.

I have reared two generations of the Tanypus (the larvæ of which I hope to show in a future paper) in a glass vessel covered with gauze, and from which they never came out. I commenced with larvæ which went through the metamorphoses of pupa and imago, which again laid their eggs, from which I had the larvæ, pupæ, and imagos again, and these were all reared in water from a cesspit.

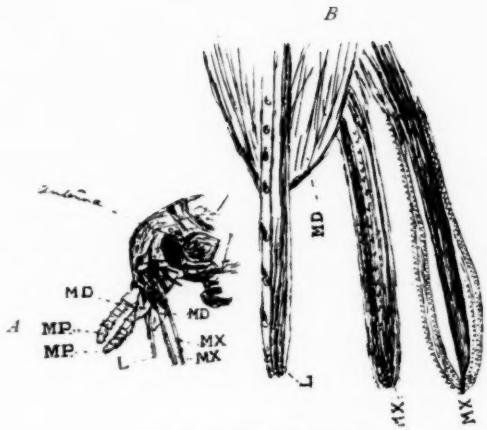
Now just imagine a gnat or a mosquito with her maxillæ fouled with these juices, being disturbed in her repast by a warm-blooded human being. This is a *bonne bouche* which she spares no time in attacking, and after piercing the skin she introduces her soiled maxillæ, reeking with whatever putrefactive organisms may have been playing their part in the foul medium in which she had been feeding, with the result that what is commonly and probably rightly called "blood-poisoning" supervenes.

The illustrations will show what a perfect apparatus the gnat, mosquito, midge, and other blood-sucking insects have for carrying their infective material from host to host, or from decomposing organic matters to a warm-blooded host.

It seems to me that in a study of these flies' mouths, too, we have a very satisfactory solution to that question which is sometimes still asked—how we can account for some of those mysterious outbreaks of specific diseases where every precaution is supposed to have been taken against the possibility of the disease-producing organisms gaining an access to the body tissues of healthy men or animals; and even now educated people are occasionally found who assert that these outbreaks must be due to spontaneous origin, as they cannot otherwise be accounted for. Well, old ideas die hard, but the little inoculating instruments in the mouths of the flies might be responsible for many of those cases that we are told could not have been contracted by either contagion, infection, or food.

If the subject is of sufficient interest I should be happy, on a future occasion, to give an account of the life histories of these flies, a knowledge of which is essential if we would protect ourselves and our stock from their baneful influence. Most of them breed in filth and decomposing organic matters, and we shall learn that cleanliness must still be the war-cry of those engaged in the struggle against disease.

It is possible that some reader of this article might wish to mount specimens of some of these mouths; if so, the method of procedure is to soak the mouths in liquor potassæ, then transfer them to clean water, which must be changed three or four times, then dehydrate them in alcohol, clear them in oil of cloves, and mount them in Canada balsam.



(7) FLEA (*Pulex irritans*).

A. Head, showing mouth organs. *B*. Extremities of mouth organs highly magnified. *L*. Tongue or ligula. *MD*. Mandibles. *MX*. Maxillæ.

SEPTICÆMIA DUE TO ENSTRONGYLUS VISCERALIS.

BY MAJOR H. PEASE AND CAPT. A. SMITH, I.C.V.D.

THE *Enstrongylus visceralis* (Gmelin) or *Strongylus gigas* (Rudolphi) does not, so far as my experience goes, appear to be at all common amongst dogs in the Punjab; in fact, it has only been found in one dog in some hundreds of *post-mortem* examinations, and that in a spaniel which is not an indigenous breed. The animal was, however, born in India, and had not left the country during its lifetime, so it is evident that the parasite was an indigenous one. The dog in question had not shown any marked symptoms of illness until about a week before death, when it was noticed to be very bad tempered and inclined to bite. It was examined and found to be suffering from severe fever, for which it was treated. The fever was of a remittent type, but gradually the dog became stupid and somnolent, and the mucous membranes were slate-coloured, until death took place. We could not account for these symptoms, as there was no detectable lesion which would be likely to cause them. *Post-mortem* examination, however, revealed the fact that the right kidney was almost entirely destroyed, the tissue much thickened, and containing amidst a bloody pultaceous substance a fully developed strongyle, which had died, and was undergoing decomposition.

NOTE ON THE ACTION OF A VIOLENT PURGATIVE IN BRINGING OUT THE SYMPTOMS OF GLANDERS.

BY P. CONNOLLY, M.R.C.V.S., LONDON, E.

THE patient was a van-mare about eight years old, and was being treated for grease in one fore and one hind heel. These progressed satisfactorily, and were all right for three days, during which time she stood idle. One morning the owner came with the message that the mare had suddenly become lame and had a swollen hind leg. Upon examining her I found the swelling to be on a leg which had not been affected with grease. The whole limb had the characteristic appearance and touch of lymphangitis, was intensely painful, and the inguinal glands were enlarged. In all other respects the mare's skin appeared perfectly clean and free from sores. The rectal temperature was 105°, and a diagnosis of lymphangitis was made. A full dose of aloes was prescribed, together with hot fomentations and lotions to the limb. I saw the mare again thirty-six hours later; she was purging violently, and there was a distinct chain of four or five typical large farcy buds on the inside of the leg, whilst on the other hind legs two or three had developed. Mallein was injected, the temperature being 102·6° when tested at 3 p.m.; at 9 p.m. it was 104°, and it had fallen again in twenty-four hours to 102·2°; whilst at the seat of injection there was the characteristic swelling reaction. The requirements of the law were carried out, and the *post-mortem* examination showed the lungs to contain a number of glander nodules.

The case is of interest as confirming two points: first, that the debilitating influence on the system of a violent purgative hastens forward the devastating influence of the glanders virus; and secondly, it illustrates the rapidity with which the cutaneous lesions are manifested, as a very keen examination made not only by myself but by two qualified colleagues only thirty-six hours before detected nothing unusual in the surface of the skin where I subsequently found the well developed farcy buds.

ERYSIPELAS AND DEATH FOLLOWING A LACERATED WOUND.

BY CAPTAIN C. B. M. HARRIS, D.S.O., CANTERBURY.

On the morning of 20th January last, I admitted into hospital a bay mare, 7th Dragoon Guards, aged 5 years, suffering from a severe lacerated wound anterior to point of off hip, caused by collision with a cart, whilst at exercise.

Examination revealed considerable hæmorrhage, extensive bruising of tissues around the wound, and, owing to the peculiarity of the part, a "pocket" between the loose skin anterior to the faschia lata and the abdominal faschia beneath, from which most of the blood emanated.

The wound was washed with hot water, syringed out with Sol. Hydrarg. Perchlor. (1-1,000), and plugged with carbolized tow.

An attempt was made to sling the patient, but this was not persisted in, owing to her violence. As a precautionary measure I gave subcutaneously ʒv of antitetanic serum. The mare was then comfortably fixed up. The temperature, pulse, and respirations were normal.

On the evening of same day there was slight swelling around the wound, but otherwise no change. The temperature, pulse, and respirations, as in the morning, were normal, and patient had a good appetite.

Next morning (January 21), I noticed a change for the worse. *Symptoms*: An œdematous brawny swelling of off-hind thigh, extending to the hock and beneath abdomen great pain causing pressure and distension of superficial veins. The temperature was 103°, pulse full, and there was general malaise.

Treatment.—I prescribed an ordinary stimulant, and incised the swellings from which a quantity of serum exuded. Continual fomentations were applied, and the wound was dressed as previously mentioned.

January 21, 5 *p.m.*—The swellings of morning had increased, and the "brawniness" was more marked. Temp. 103°, pulse running down, and patient in a bad way. At 9 p.m. the patient struggled violently, collapsed, and died.

Post-mortem Examination.—On opening the swellings a semi-solid inflammatory exudate was evacuated, with sloughing of tissues noticeable in parts. The other organs showed no special features.

Comments.

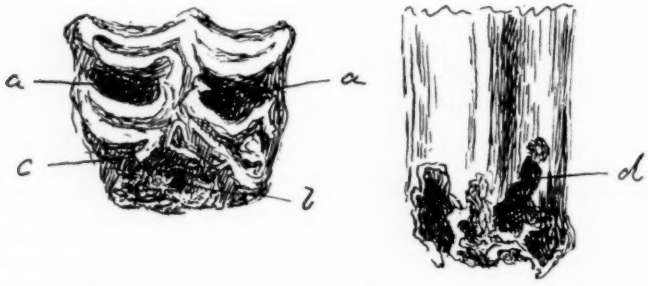
The cause of death was, I take it, syncope due to septic infection, a condition due to defective antiseptic precautions, which were unavoidable. I erred in not extending the laceration on first examination of the case, and thus doing away with the "pocket," which undoubtedly favoured the development of septic organisms. I hesitated owing to the extent of the resulting wound.

A CASE OF DENTAL CARIES.

BY R. J. HICKES, F.R.C.V.S., MARKET WEIGHTON.

THE animal was a five-year-old cart mare and a year before, when at grass, was supposed to have had a kick from another horse on the superior maxilla, about the site of the root of the second molar. The mare was found with a swelling which slowly increased in size and had a sinus into it but only a slight discharge. I was asked to see her about a year after the swelling had been first noticed and after treatment by blisters and injections into the sinus had been abandoned.

The enlargement on the maxilla at this date was about the size of an orange, and the discharge from the hole in its centre was trifling and free from smell. The mare was in good condition and mastication properly performed. Extraction of the tooth was not difficult and the animal was kept only a week from work after the operation. The bony enlargement on the superior maxilla has decreased considerably in size, and appears now to be stationary.



Grinding Surface of Tooth of Horse.—(*a*) Deep empty pits which should have been filled up with cementum. (*b*) Hole leading into pulp cavity. (*c*) Surface from which the inner pillar has been broken off. (*d*) Irregular absorption about end of root; this also freely opens into the pulp cavity.

The carious tooth was sent to Mr. Charles Tomes, F.R.C.S., who very kindly made the accompanying sketch and furnished the following technical description:—

At first glance it is obvious that this tooth has for a considerable time been the subject of inflammatory processes about the end of its root. The characteristic marks of absorption, some of the dentine having been removed on one side, are present as well as evidences of irregular deposition of cementum on and about the area of absorption. From the history of the case it would seem that there was ultimately suppuration, but it is probable that a chronic inflammation had for some time preceded the occurrence of suppuration and that during this period the alterations in the hard structures took place. In seeking for the cause of this inflammation, which is the usual sequel of the death or partial death of a tooth pulp, an interesting state of things is found. The somewhat detached inner pillar of dentine and enamel, which in Hipparion, one of the ancestors of the horse, was quite

detached, is in the modern horse more closely fused with the rest of the tooth and made up into a solid block with it by the interposition of cementum. The dentine and enamel of the top of this pillar have been broken away obliquely in such a manner as to leave an opening into the tooth pulp. This had inflamed, perhaps portions of it had died, and the inflammation was propagated down through the damaged pulp to the root. So far the explanation is simple and recalls similar accidents which have happened with like results in dogs, but it is difficult to see how the solid block of a horse's tooth could be fractured in such a way if the tooth was of normal construction. This particular tooth, however, was not normal: instead of the cementum filling up all of the valleys solidly between the enamelled cusps of its crown, it had failed to do so, and there are crescentic pits which should have been filled leading down for an inch and a half from the surface. Similarly there appears, so far as can be judged from what remains, to have been a deficiency of cementum around the inner pillar which was thus left comparatively unsupported and more liable to be broken. In the tooth, therefore, there was an original defect tending to weaken it, and by some accident, possibly the kick of another horse knocking the jaws together, the outlying portion was splintered off.

LUXATION OF THE FLEXOR PEDIS TENDON FROM THE POINT OF THE HOCK.

BY LIEUT. G. W. TYSON, ARMY VETERINARY DEPARTMENT.

THE patient, a bay mare aged six years, had been under treatment since October 21, 1904, from a supposed contusion to the off hock, on which date she came back from a reconnaissance very lame, and could not put the foot to the ground.

To all appearance the injury was an ordinary capped hock, with implication of the bursa. The animal was exceedingly difficult to handle, but the swelling appeared to be hard and lay beneath the tendon, and on manipulation it was found that it could be moved off the point of the hock to the outside, but did not cause any pain. It also stepped to one side with a "click" if the animal moved or put any weight on the limb, and when trotted was displaced about every third step, almost causing her to fall down. As the patient clearly would never be fit for military duties again, she was sold out of the army.

STRICTURE OF THE BOWEL IN A DOG.

BY ARTHUR PAYNE, M.R.C.V.S., WEYBRIDGE.

THE patient was an Airedale terrier which I had known since June, 1903, since which time the animal had appeared in good health and had never been under veterinary treatment, with the exception of a dose of worm medicine now and again. He always looked in poor condition and was somewhat staid in his manner, with a wistful expression of countenance.

I was requested to call about January 18th, as he had been vomiting for the last few days. He was looking very seedy and I found he had refused all food for two days, and they could not remember

when his bowels moved last; the urine was passed naturally, and was a dark amber tint; temperature normal, nose cold and moist, tongue normal, mouth sweet and clean, and I could detect no abnormality of the heart or lungs; the stomach and intestines were apparently empty, the patient stood with head depressed, back arched and tail down.

As I was doubtful about the attention he would receive at home, and the owner was away, I proposed he should come into hospital; he was sent the following day.

The dog first received an enema, which was returned without any accompaniment; examination *per rectum* revealed nothing.

Administered calomel gr. ii, but he vomited about half an hour after; beef tea was given at frequent intervals, but very little was retained. Bismuth and soda were administered with a like result.

20th. During the night he had two or three evacuations of the bowels, scanty, yellowish tinted, and mixed with mucus, and he had also vomited several times.

During the day he received Mackey's mixture, of Bismuth Co. and fed at frequent intervals with Brand's essence; the sickness persisted to although it was not quite so violent; towards the evening gr. $\frac{1}{20}$ of morphia muriat. was administered about every two hours, with a certain amount of success, for during the night he had only been sick twice.

21st. He vomited again after receiving about 4 ozs. of Benger's, so a tablet of morphia was given and about 2 ozs. of beef tea about an hour after, this being retained. Throughout the day he was given Brand's essence, and beef tea in small quantities; when vomiting occurred, which was very occasional, a tablet of morphia was given.

22nd. No signs of sickness during the night, and he voluntarily took some milk and lime water; during the day he was given Benger's food, made with water, and was only sick once. For medicine he had Mackey's Bismuth Co. every four hours.

23rd. Still no more vomiting, but would take no food of any kind; no action of the bowels. Examined rectum again without any result. In the morning he was fed with Benger's and the rest of the day beef tea and Brand's. Continued the Mackey's mixture and at night Calomel gr. ii.

24th. One evacuation of bowel during the night, same as former in appearance; took voluntarily a small quantity of minced raw beef. He was given the usual liquid nourishment during the day, as well as Hewlett's liquid malto-phosphates.

25th. No sickness, but refused all food; from this date onwards he was tried with fish, tripe, &c., at different periods, but refused all; he was given the usual liquid foods and in the way of drugs he received, besides those mentioned, quinine, Hewlett's tonic mixture, thioform, orthoform, cascara sagrada, &c., but all to no purpose. He slowly got worse; sickness only occurred very occasionally, he simply got thinner and weaker, and died quietly on the day mentioned. He was a splendid patient, taking his medicine and food which was given him without any resistance whatever.

Post-mortem examination revealed a stricture of the duodenum, which was greatly thickened and enlarged, and as tough as a piece of tendon. The lumen of the gut was so small that I could barely insert the point of an ordinary metallic probe into it.

SUPERNUMERARY DIGIT IN A FOAL.

BY J. F. CRAIG, M.A., M.R.C.V.S., PROFESSOR OF ANATOMY, ROYAL VETERINARY COLLEGE, DUBLIN.

A SPECIMEN showing the above peculiarity was sent to the Royal Veterinary College of Ireland on June 27th, 1904, by A. Marsh, Esq., of Hay, Hereford. The limb to which the extra digit is attached is the off-fore and was removed from a foal of an ordinary cart-horse breed at the intercarpal joint. In other respects the animal was said to be quite normal. The accessory digit is almost equal in size to the main digit and is provided with a horny appendage (hoof) similar in appearance to that of the ox and resembling the one covering the extremity of the other digit. It is enveloped as far up as the upper extremity of the first phalanx with a separate fold of skin. The limb thus visibly terminates in two well-formed digits and presents, therefore, a certain amount of resemblance to the fore-limb of the calf, for which it has been mistaken. This resemblance will be noticed in the accompanying photograph. At and above the fetlock joint the two digits are covered by a common skin. The accessory digit is provided with a metacarpal bone about three inches in length and somewhat cylindrical in shape, but narrowing towards its upper extremity. There it is movably articulated to a small projection on the outer side of the large metacarpal bone and in front of the shaft of the outer small metacarpal bone. Two small sesamoid bones are found at the back of the articulation between the metacarpal bone of the extra digit and the os suffraginis of the same digit. There are three well-developed phalanges forming the framework of this appendage. The last phalanx (os pedis) is similar in appearance to the os pedis of the ox. Two normal small metacarpal bones are situated behind the large metacarpal bone and form with it, as usual, the groove for the accommodation of the suspensory ligament of the horse.

On the skin being removed the following appearances were presented. The large metacarpal artery placed in its usual position on the inner side of the metacarpus in front of the flexor tendons detaches a branch a little above its bifurcation. This branch descends behind the flexor tendons to gain the accessory digit on the outer side and break up a little above the fetlock joint into two small vessels which pass downwards, one on each side of the accessory digit, just as the digital arteries do in a normal digit. The blood supply to the main digit is normal.

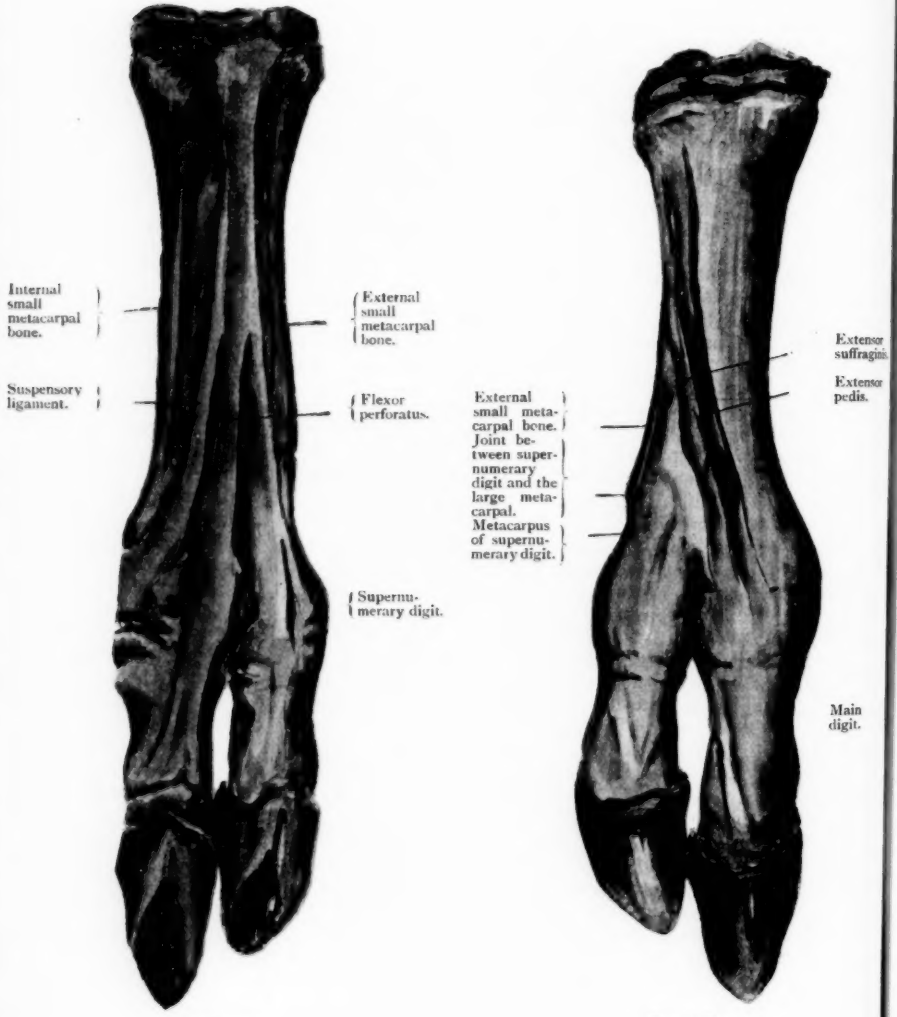
The extensor pedis and extensor suffraginis are situated as in ordinary limb on the outer side of the front of metacarpus and are attached only to the bones of the normal digit.

The flexor perforans tendon gives off a small cord-like branch from its outer border about the middle of the metacarpus. This branch descends towards the back of the accessory digit and becomes inserted into the connective tissue at the back, as well as into the os pedis of that digit.

A small thin band is also detached from the tendon of the flexor perforatus at a point near the origin of branch of flexor perforans. This band is inserted into the upper extremity of the os suffraginis of the accessory digit on its outer side.

The accessory digit is supplied also with a small branch from the

suspensory ligament, which ends chiefly in the smal' sesamoid bones of the extra digit. Small strands from this branch are sent round the first phalanx, one on either side, to meet a little above the coronet and



Sketch of the Supernumerary Digit.

end on the pyramidal process of the os pedis. These simulate the ordinary branches of the ligament in disposition.

The accompanying sketches were executed for me by Mr. A. Duncan, M.R.C.V.S., Royal Veterinary College of Ireland.

FRACTURE OF DORSAL VERTEBRÆ.

BY J. W. BROWNLESS, M.R.C.V.S., KENSINGTON.

SOME months ago I was asked to look at a five-year-old hackney mare, said to be stiff behind. On examining her I found she was very lame on both hind limbs, with straddling gait and a want of co-ordination in her movements. Pulse, temperature, urine and fæces normal. I was unable to find any cause for the symptoms, except that I thought she evinced pain on pressure in the lumbar region. The mare was given a physic ball and hot fomentations applied to loins. She gradually got worse and in a few days could only get up with assistance. Slings were tried, but she would not rest in them. At the end of ten days she showed loss of power in her fore limbs and was unable to stand even when placed on her legs by means of slings. Being now nearly covered with bed sores she was destroyed.

Post-mortem examination revealed the fact that the second and third dorsal vertebræ had (at some previous date) been fractured in a longitudinal direction right through the body of the bone. The fracture was partially repaired by means of cartilaginous material, which, in addition to uniting the bone, had also pressed on the spinal cord to such an extent that the canal was nearly obliterated. How, when, and where, the fracture had occurred, I am unable to suggest. In conclusion, I might say that I had known the mare ever since she was foaled, and having seen her almost daily, would have heard of any accident that might have happened to her.

PARTIAL DISLOCATION OF CERVICAL VERTEBRÆ.

BY R. LEWIS GREEN, M.R.C.V.S., DUDLEY.

SUBJECT.—An aged waggon-horse.

HISTORY.—I was called in to see this animal, and on arrival found him standing with head hanging down and twice its normal size, the nose only two inches from the ground and paralysis of the lips, with neck swollen a third of the way down. Neither the owner nor his men could give me any material help as to the cause of this; all they knew was, they found him in this condition at 7 a.m.

Manipulation of the head and neck in this position revealed nothing, consequently suspected an obstruction of a large blood-vessel, so advised the owner to float him to our infirmary; this he did the same day.

On arrival he was placed in a loose box, a strong head-stall with a ring in nose band, to which was attached a rope running through a pulley in the ceiling put on, and his head slung about manger high; this operation caused pain and in this position I could see the nose was turned to the left, paralysis of the lips more noticeable.

The head was kept slung in this position all night, when to my great surprise on visiting him next morning the excessive swelling of the head and neck had entirely disappeared, but the paralysis of the lips continued; the animal was unable to raise the head any higher, or support it when the sling was removed. From this fact I came to the

conclusion that there was no thrombus, but injury to the spinal cord, the cause of which I looked for.

It was apparent, now that the swelling had subsided, the neck on left side was concave, and on the right convex in the situation of the third and fourth cervical vertebræ. On manipulation no fracture could be diagnosed, but it was undoubtedly a case of partial dislocation of the cervical vertebræ.

I decided upon an attempt at reduction, for which purpose I placed the animal in "stocks," passed the rope attached to a ring on the nose band of head-stall through a block and pulley placed in the ceiling slightly in front of the nose; I then had a man on each side of the neck to apply pressure at a given signal, when the man at the rope was instructed to pull the head up suddenly, at the same time side pressure being applied. This procedure had the desired effect, for the bones assumed their normal position with a jerk and a decided snap. The animal, from the shock, at the same time reeled backwards in the stocks and burst out with beads of sweat over the whole body.

I left the horse standing in the slings, his head supported from above to a little below its normal height. After a couple of hours we found he took the weight off the head-stall and continued to support his own head.

He was kept quiet in a loose box on soft diet for a few days, made an entire recovery, walked home five miles, and has continued at work ever since.

A CASE OF RENAL CALCULI IN A HORSE.

BY J. F. CRAIG, M.A., M.R.C.V.S., PROFESSOR OF ANATOMY, ROYAL VETERINARY COLLEGE, DUBLIN.

THE subject was an aged grey gelding, about 17 hands high, in very poor condition and marked by superficial ulcers over the haunch and sides of the shoulder. This animal was obtained for the purposes of dissection at the Royal Veterinary College of Ireland in January of this year and kept alive after purchase for several days prior to slaughter. During the latter time nothing unusual was observed in the horse and no history of any peculiarity or of any previous illness was received.

During the course of dissection, after the bowels were removed, an examination of the kidneys in position was made. On the right side, instead of a right kidney, a very large hard stone-like substance was felt. This body could be made to grate on similar smaller pieces on its inner side. The tissues surrounding these abnormalities were then cleared away and the neighbouring parts carefully examined. Only a very small piece of kidney substance remained and that chiefly around the outer face of the hard bodies. It became apparent, therefore, that these latter were pelvic calculi which had originated in, and developed from, the deposition of the salts of the urine in the pelvis of the kidney. As the calculi had increased in size they pressed on the kidney parenchyma and caused it to atrophy. This atrophy had extended until very little of the right kidney was left.

There were five calculi in all, one of which was much longer than the others. This large one was of the size, and had the rough appearance, of a large horse's astragalus; two of the smaller calculi were of the size of hazelnuts, a fourth one was similar to, but rather smaller than, the average sized os magnum of the horse's carpus, and the last one was similar to the fourth on surface view, but very much flatter. All the calculi were hard and dense, greyish-brown in colour, and for the most part, mulberry-like on the surface. The points of contact between the calculi and the exterior are smooth, and here a striated appearance is shown, indicating the manner in which the growth of the calculus had taken place. The large calculus

Photograph of the Renal Calculi.

weighed 1 lb. ½ oz., and the other four calculi together weighed only about two ounces.

An analysis was made by Professor Abriel to ascertain the composition of the calculi, and the following result was arrived at.

Calcium carbonate	...	...	85 per cent.
Calcium phosphate	...	...	12 ,,
Calcium oxalate	...	...	2·5 ,, (about)
Organic matter	...	...	·5 ,,

The left kidney was slightly increased in size, but otherwise normal. It weighed 2 lb. 1 oz.

[The accompanying photo indicates the appearances of these calculi.]

A LADY'S HAT-PIN IN THE STOMACH OF A PUPPY.

BY JOHN B. TUTT, F.R.C.V.S., WINCHESTER.

THE patient was a rough-haired terrier puppy, three years old, and was brought to me with the history that immediately after swallowing food it vomited. The owner thought it had swallowed a small rabbit-bone. I noticed that the dog was unable to turn its head properly and that when it attempted to do so it cried out with pain.

In turning round he moved his body stiffly and all in one piece. I examined the throat, but could detect nothing, and the probang was passed quite easily. I administered bismuth and soda internally, and the sickness stopped, the patient taking food with avidity. About ten days or a fortnight later a swelling appeared in the lower third of the neck; I cut down upon this, but could not discover anything. Not feeling quite satisfied, I operated again a few days later, and upon digital examination I found the point of a lady's hat-pin embedded in one of the cervical vertebræ. It took some little manipulation to extract it. Upon showing the pin to the owner he gave it as his opinion, from some history which he recollected, that it must have been swallowed about five weeks previously.

The pin was an ordinary black-headed bonnet pin rather more than five inches long.

DERMOID CYST, CONTAINING TEETH, IN THE TESTICLE OF A HORSE.

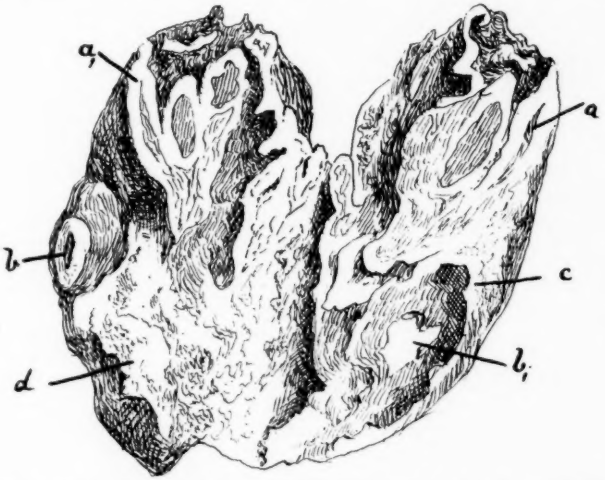
BY JAMES CLARK, F.R.C.V.S., COUPAR ANGUS, N.B.

THE patient, a Clydesdale colt, yearling in 1904, was the subject of an ordinary castration operation, and had both testicles normally placed in the scrotum. The left one had nothing about it worthy of remark, but when I came to manipulate the right one I noticed it to be very much harder in consistency than normal; in fact, it was literally "as hard as a stone." It was removed by torsion in the ordinary way, and upon incising it afterwards it was found to contain distinct incisor and molar teeth, as shown in the illustration, for which, and the following description, I am indebted to Mr. Charles Tomes, F.R.C.S. (Author of "Dental Anatomy").

Mr. Tomes writes: "Dermoid cysts in the human subject occur in the ovary with some frequency, and next to the ovary the testis is their most common site. In the latter they are rare and seldom contain bone or teeth, but only hair; cases are, however, on record in which numerous well calcified teeth have been found in the testis. How they originate is a matter on which difference of opinion still prevails; the idea, however, that there has been inclusion of a second fœtus within the one which had gone on to full developement is now abandoned, and it is more probable that these aberrant tumours are due to the accidental inclusion or infolding at an early period of development of some portion of the germinal layers of the embryo.

"In this case calcification has gone on to a very considerable extent, so that when dry the mass weighs nearly two ounces, and measures roughly $2\frac{3}{4}$ inches by $1\frac{1}{2}$ inches. It is mostly made of dental tissues, though there is some bone.

"The teeth, of which there are several, follow two types; some are more or less like incisors, one of which, cropping out upon the surface, shows a mark, whilst others are more like the molar teeth of the



Dentigerous portion of testis (actual size) divided through its long axis, and the halves turned back.

(*a.a*) Cut surface of molariform teeth. (*b*) Teeth of incisor form. (*b'*) Surface of tooth apparently of incisor form. (*c*) Bone. (*d*) Tooth of rather indefinite form, the other end of which shows a "mark."

horse. But, as is usual in these dermoid cysts, the crowns of the teeth are much more developed than their roots. There appear to be four teeth of incisor type and only one molar, but it is impossible without mutilating the specimen to be sure of the exact number. The teeth are mainly composed of dentine and enamel, very little cementum being apparent, and on microscopic examination the dentine and enamel are both found to be fairly well formed, and present the structure appropriate to the horse. The bone, which is only present in small quantity, is less well developed, and is coarse in texture. This also is quite usual in dermoid cysts. For some reason not easy to understand, the dental tissues are generally typical in structure and comparatively well calcified, whilst it is not uncommon for the bone in which they are loosely implanted to be very imperfect in its calcification. In this specimen there is no attempt at the formation of a definite jaw-bone or piece of a jaw-bone, as sometimes is seen in the cysts; but the teeth are irregularly thrown together with no arrangement of definite character.

"One tooth is detached, but as it shows a fractured surface it was probably detached in sawing through the mass. The whole is enveloped by the dried remains of a connective tissue capsule."

Below our readers will find the continuation of a series of Original Articles from the pen of Lieut.-Colonel Nunn, on "Veterinary Toxicology." It is expected to publish these articles in book form at the conclusion of the series.

GASES AND VAPOURS.

BY LIEUT.-COLONEL J. A. NUNN, F.R.C.V.S., F.R.S.E., C.I.E., D.S.O., BARRISTER-AT-LAW, DEPUTY DIRECTOR GENERAL ARMY VETERINARY DEPARTMENT.

(*Continued from p.* 178.)

ORGANIC SUBSTANCES.

A. ORGANIC ACIDS.

1. CARBOLIC ACID.

Applied externally it withers and shrivels up the epidermis. In about ten minutes the dermis is congested and tumefied, and a thin scale is formed which falls off, in about fifteen to twenty days, with the hair, which however is reproduced and leaves no trace. (Delsol, *Recueil de Médecine Vétérinaire*, 1872, page 532.)

Symptoms.—The first symptoms noticed are those produced by the caustic action and consist of stomatitis, pharyngitis and gastro-enteritis, much the same as those produced by mineral acids, but not so severe. When absorbed into the general circulation the special toxic properties which exert themselves on the nervous centres are seen. The animal is rather anxious and distressed. There are fits of rigors and toxic and clonic convulsions, followed by paralysis of the hind quarters. The pulse is quick, small and irregular, and almost imperceptible; respiration quick and difficult, temperature sub-normal. The animal is unable to keep on his legs, falls down and dies in deep coma.

Zwaardemaeker in the cat noted that there was progressive respiratory paralysis. Decroix records a case of poisoning in the horse by bathing in a 10 per cent. solution, and this case was complicated by suppression of the functions of the skin.

Treatment.—If available, vinegar in the same quantity as the dose of carbolic acid should be given; and emesis should be encouraged when practicable. Oleaginous purgatives should be used with mucilaginous drinks and Glauber's salt to neutralise the poison, turning it into phenal sulphuric acid, which is secreted by the kidney. The pharyngeal and laryngeal irritation can be relieved by inhaling steam.

Husemann speaks with favour of the use of saccharated lime.

Chemical analysis.—The contents of the stomach and intestines, blood, urine, liver and brain, can be submitted to analysis, and they all give off the characteristic smell of carbolic acid. They are macerated in alcohol or ether for twenty-four hours, filtered and then distilled at a low temperature. The residue is treated with ether, which is evaporated, leaving the poison in crystals, and which gives the following reactions:—

(1) The characteristic smell.

(2) With a dilute solution of a persalt of iron a violet blue colour.

(3) An aqueous solution of bromine gives yellowish white needle-shaped crystals of tribromophenol.

(4) An excess of ammonia and a solution of hypochlorate of lime gives a dark blue.

It is in many cases important to ascertain the quantity which is done with the tribromophenol. Giacausa's method is: dissolve 15 grammes of caustic potash in a litre of water and gradually add 10 grammes of bromine; a solution of hypobromite is thus obtained, which is diluted, so that 50 cc. correspond with 10 c.c. of a half per cent. solution of carbolic acid; 50 c.c. of this is placed in a glass and the suspected fluid added till it is discoloured, the quantity used being a guide to the amount of carbolic acid present.

It should be remembered that carbolic acid is sometimes present in normal urine, especially in the herbivora and as much as 0·9 gramme has been detected in that of the horse; also it is often given for medicinal purposes; and for these reasons chemical analysis must not alone be relied upon.

II.—OXALIC ACID.

Oxalic acid and certain of its salts are powerful poisons, and cases of animals having been destroyed by them are recorded, particularly with the acid, on account of its resemblance to sulphate of soda or magnesia, for which it is mistaken.

It is found in certain plants, rhubarb and sorrel, in the form of potassium or calcium oxalate, and is commonly known as salts of sorrel.

This plant is grown as forage in parts of the Continent, and feeding on large quantities has been known to cause accidents.

It is used by leather and straw makers, and for domestic purposes, such as cleaning brass work and removing stains of ink. It is a white crystallised powder, very soluble in water, with a bitter, inky taste.

It is absorbed unchanged from the intestines, and eliminated in the form of oxalates in the urine.

In a concentrated form it is a corrosive and powerful irritant, giving rise to acute gastro-enteritis, but is less likely to cause perforation than some of the mineral acids. According to Huseman, it has a general action on the nervous system and is a powerful cardiac depressant. The exact poisonous dose is not known, as it greatly depends on the degree of concentration and the local effects produced, but Kauffmann gives the *medicinal* doses as:

Carnivora	½ to 1	gramme
Small ruminants and pigs ...	2 to 3	,,
Large animals	4 to 8	,,

Journal of Veterinary Medicine, vol. ii., gives the toxic dose as fifteen grains for the dog and three for the cat. Finlay Dunn, "Veterinary Medicine," page 193, says that two drams killed rabbits in fifteen minutes and half a dram in thirty.

Symptoms.—These appear suddenly in the form of violent and painful colic, with nausea, vomiting and diminished force of circulation, the heart beats being very weak and feeble, death taking place very rapidly, sometimes in the course of a few minutes.

Lesions.—The *post-mortem* lesions are chiefly found in the stomach, and are characterised by acute diffused inflammation. The mucous coat of the stomach is of a dark red colour, thick and friable, the muscular coat tumefied, infiltrated and studded over with ecchymosed

patches. If the *post-mortem* examination is made soon after death, the blood is of a bright red colour, as is seen in carbonic oxide poisoning, and if the animal has lived any time, crystals of oxalate of lime will be found in the urinary tubes of the kidney.

Treatment.—It is not possible to neutralise the acid with alkaline carbonates, as the oxalates that are formed are themselves poisonous. Lime water, carbonates of lime and magnesia, and saccharate of lime are indicated, with milk, with the object of forming oxalate of lime, which is eliminated by an oleaginous purgative, emetics are counter-indicated.

Chemical Analysis.—The contents of the stomach and part of the organ itself are examined. The material is finely divided and treated with boiling water, slighly acidulated with hydrochloric acid The fluid is filtered and evaporated to dryness over a water bath, and treated with alcohol which dissolves out the oxalic acid. This is again filtered and evaporated, leaving behind the acid, which is treated with water. It gives the following reactions :—

(1) With chloride of lime a white precipitate is given, soluble in hydrochloric and nitric acids, insoluble in acetic.

(2) With nitrate of silver a white precipitate is given, soluble in both ammonia and nitric acid. When dried it explodes on being heated.

(3) The addition of a drop of sulphuric acid in the solution will, on being heated, reduce chloride of gold and permanganate of potash.

(4) The residue of the solution after evaporation, heated in a test tube with a drop of sulphuric acid, gives oxide of carbon, which burns with a blue flame.

In making these tests it should be remembered that oxalates exist normally in the body.

B. Organic Bases.

1. Opium and its Alkaloids.

Opium is the inspissated juice of the Papaver somniferum. There are nineteen or more alkaloids. Morphine, codeine, and narceine are used in human medicine, but the latter is of no use in veterinary practice, and the first is the most important.

Claud Bernard and Rabuteau give the following table of the degree of toxity of the different alkaloids in animals and man.

Man.	Animals.
Morphine	Thebaine
Codeine	Codeine
Thebaine	Papaverine
Papaverine	Narceine
Narceine	Morphine
Narcotine	Narcotine

According to these authors, in animals hydrochlorate of morphine is twenty times less toxic than the same salt of thebaine.

Morphine is obtained in colourless, prismatic, inodourless crystals, with a very persistent bitter taste. In cold water it is nearly insoluble, but is in the proportion of one to 500 in boiling; also in alcohol. It is insoluble in ether or benzine. It combines with most acids forming soluble salts, the acetate hydrochlorate and sulphate being most commonly used.

M. Hugounenq gives the following equivalents of other preparations to one of morphine :—

Extract of opium	5	parts
Hydrochlorate of morphine	1·26	,,
Tincture of opium, Sydenham	80	,,
Tincture of opium, Rousseau	40	,,
Tincture of opium (French codex) ...	65	,,
Dover's powder	50	,,

It is exceedingly rare to hear of animals eating poppies, as the taste is bitter, but in parts of southern Europe accidents from this cause have taken place. Poisoning generally has taken place from the accidental administrarion of too large a dose of either opium or morphine, the former generally as the tincture.

By absorption through the skin it will give rise to dyspepsia, vomiting, and constipation from suppression of the secretions. It undergoes no change in the intestines, but in the system it is oxidised, forming oxydi morphine, and is in this form eliminated by the kidneys, perspiration and other secretions. Its rapid elimination, coupled probably by slow absorption, explains the great tolerance of certain subjects for it and the large quantity that can be taken without harm.

Morphine has different actions in the different domestic animals. In the dog it has a powerful soporific effect, but in the horse and the larger ruminants this is not so pronounced (Guinard.) This effect is less marked with opium and poppy heads, which have a more complex composition. The poisonous dose of morphine has not been accurately determined in the different species of domestic animals, as it varies very greatly ; for instance, a larger dose is necessary to kill a rabbit than a dog. The poisonous dose also depends on a variety of circumstances, such as age, individual idiosyncrasy, and the way it has been taken into the system. Youth renders the animal more susceptible to the action of morphine, and certain subjects show great powers of resistance. In the human being it is well known that habitude can be acquired, some persons being able to take fifty times the toxic dose with comparatively little evil effect, and a horse can take by the mouth nearly 100 times as much opium as would kill a man.

Dr. Harley, "Old Vegetable Narcotics," gave four drams of powdered opium to a horse, with hardly any noticeable result. Hertwig found that two-and-a-half ounces caused convulsions and death in twenty hours. Finlay Dun ("Veterinary Medicines") gave an old mare and a donkey three-dram doses in solution three times a day with a fatal result on the fourth day after the ninth dose in the first case, and on the third day after the sixth dose in the second.

Dr. Harley, "Old Vegetable Narcotics," found that acetate of morphine in four-grain doses injected hypodermically in the horse caused restlessness, pawing, sweating, and slight dilatation of the pupils ; twelve grains, restlessness, and slight delirium in three, lasting for six hours ; thirty-six grains, stupor in fifteen minutes, delirium in three, lasting for twenty-four hours.

The same author found that twelve grains given by the mouth had no effect. Dr. Wood, "Treatise on Therapeutics," states that one hundred grains killed a horse in three hours.

Ruminants are not so susceptible as horses. Finlay Dun, "Veterinary Medicine," says that in the cow and sheep an ounce and four

drams respectively of crude opium had little effect. Frohner gave a cow 15 grains of hydrochlorate of morphia hypodermically, causing excitement and tympanitis that lasted for about an hour.

Dogs are more easily affected, two to three drams of opium causing spasms of the limbs, stertorous breathing, and stupor in a few minutes. Dr. Harley, "Old Vegetable Narcotics," found that 20 drops of tincture of opium injected subcutaneously in a dog weighing 25 lbs. caused vomiting in about a quarter-of-an-hour and stupor in an hour, but not true narcotism. The same observer injected half a grain of acetate of morphia subcutaneously in another dog also weighing 25 lbs., producing complete narcotism that lasted for three hours, and found that doses of two to three grains killed dogs of 12 lbs. to 16 lbs. weight in from 10 to 12 hours.

Kaufmann gives the toxic dose of morphine, used subcutaneously, as:

Horse	3 to 5 grammes
Ox	5 to 8 „
Small dogs	0·1 gramme
Large dogs	1 „

Post-mortem appearances.—There is nothing characteristic in the *post-mortem* appearance in a case of opium or morphia poisoning, the lesions being those of asphyxia. The blood is dark-coloured and fluid, and the chief organs of the body discoloured, but especially the lungs and brain, in the ventricles of which and subarachnoid space is a larger quantity of serum than natural. If the cause of death has been from eating poppy heads, there will be renal congestion and slight gastro-enteritis. The blood gives no indications on analysis as to the cause of poisoning.

Symptoms.—In the dog and small animals there is first a variable period of excitement, followed by narcotism, characterised by torpidity, drowsiness, dulness of the senses, loss of instinct and intelligence. There is difficulty standing, and a staggering uncertain gate with a fixed stupid expression of countenance. The mucous membranes are congested, and the pulse and respiration slow; temperature falls, and the animal is in a state of collapse, with paralysis and relaxation of the sphincters. Death takes place from asphyxia, and in some cases it is preceded by convulsions from the accumulation of carbonic acid in the blood.

M. Guinard has carefully studied the symptoms of opium poisoning in the ox, which are those of acute cerebral congestion. There is at first a stage of great excitement; the animal bellows, the respirations are blowing, pulse full and hard, 100 beats per minute, profuse secretion of saliva and tears; temperature rises.

In about six to eight hours coma sets in, the animal remains down with the head thrown on to the shoulder; general sensibility is diminished, the pulse and respiration become slow and laboured, and the temperature sub-normal. There is marked constipation and tympanitis, and the urine contains sugar and albumin.

In the horse the symptoms are the same as the ox.

If cattle are poisoned with poppy heads, the digestive symptoms are more marked, and the animal becomes delirious, bellowing, striking with the horns, and attacked with epileptic spasms. The symptoms develope more slowly than with the other alkaloids of opium and the tympanitis is more marked.

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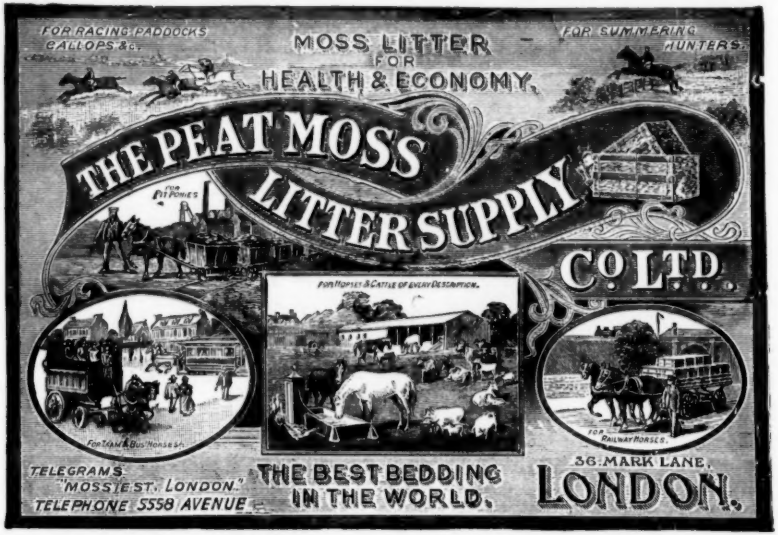
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The chronic form of poisoning (morphinism), which is not uncommon in man, is unknown in animals.

Treatment.—The stomach and intestines should be emptied by purgatives or emetics and tanin, or sulphate of zinc given to render the alkaloid insoluble. The general state of depression is counteracted by tonics such as ether, camphor, or strong black coffee; and in cases of cerebral excitement, cold applications and ice to the head.

Chemical analysis.—The contents of the stomach and intestines, vomit, liver and urine can be made use of, but in the case of the latter, it should be evaporated to the consistency of a syrup. In an analysis a double one may have to be made, both for the detection of the alcaloids mentioned, and for opium or poppy-heads in cases of suspected poisoning by the latter, in which case the characteristic essential, meconic acid, will be present.

The analysis is complicated and difficult, and as it is only necessary to determine the presence of meconic acid or morphine for all practical purposes, only the tests for these two will be mentioned.

Dragendorff's method can be used, nuconic acid being obtained from the acidulated fluid by alcohol and morphine from it, neutralised by treating it successively with chloroform and alcohol.

Meconic acid with perchloride or persulphate of iron gives a deep blood-red colour, which is not removed by boiling with dilute sulphuric acid. If the liquid contains tannic acid the red colour will be obscured by the formation of tannate of iron, which can be removed by dilute acetic acid, when the blood-red colour will reappear. Sulphocyanide of potassium also gives a red colour with the persalts of iron, but it disappears with the addition of ether.

Morphine gives the following reactions:—

(1) A blue colour is given with the persalts of iron that disappears with acids, alcohol or heat.

(2) Salts of gold give a blue colour and a deposit of metallic gold.

(3) An ammonical solution of sulphate of copper gives an emerald green precipitate.

(4) Morphine mixed with finely-powdered sugar gives a purple colour, changing to violet and green with a drop of sulphuric acid.

(5) Dragendorff gives the following table, showing the relative sensitiveness of certain tests for morphia.

One-fifth of c.c. of a $\frac{1}{5000}$ solution of sulphate of morphine with iodide of potassium or bismuth gives a distinct precipitate. With chloride of gold the solution becomes turbid, with bromide of potassium a distinct precipitate.

One-fifth c.c. of a $\frac{1}{1000}$ solution with iodide of mercury or potassium gives an abundant amorphous precipitate. With iodide of cadmium or potassium a precipitate that crystalises in about an hour or two. With tannin, a slight cloudiness. With nitrate of silver slight cloudiness in about five minutes.

The same quantity of a $\frac{1}{100}$ solution with chloride of platinum gives a slight precipitate; with chloride of mercury, a crystalline precipitate; with bichromate of potash, a very slight disturbance, and with picric acid, a profuse precipitate.

Medico-legal.—Morphine is preserved for a long time in the system. Stas has recognised it in a body that had been buried for thirteen months, but the analysis is rendered more difficult by advanced decomposition.

(*To be continued.*)

Translations and Extracts.

FOWL CHOLERA.

Abstract from a Report issued by the Californian College of Agriculture.

Fowl Cholera in California.—In October, 1903, a poultryman reported to the Agricultural Experiment Station that severe losses from "the cholera" were occurring upon his own and other ranches in Marin County. The presence of the disease was brought to his notice three weeks before by twelve dead hens being found under the roosts on one morning. On the second day as many more were found, after which deaths practically ceased for a week, when losses again occurred at the rate of from six to ten a day. In the three weeks from the start the disease had spread to four adjoining colonies, and about one hundred fowls had died during the time.

The poultry ranch in question was stocked with about three thousand fowls, distributed over several hundred acres of land, in colonies containing about one hundred and seventy-five fowls. Each colony was supplied with roosting houses, a laying house, a grain-feeding hopper, feeding troughs, and drinking-water fountain. The several colonies were near enough together so that those hens venturing fartherest abroad duirng the day would intermingle with those from other colonies—a fact of significance in relation to the spread of the disease. The writer has observed hens to go several colonies from home, attracted by the feed in the waggon from which the daily rations were distributed.

An experiment was performed to determine the length of time elapsing between exposure to infection and death. Ten cockerels were selected from one of the colonies that was free from disease, and, as subsequent events proved, so remained. All were placed in a crate, and were allowed to eat freely of the entrails and flesh of a fowl dead of the cholera. The dates of death are recorded in the following table:—

TABLE I.

Deaths after eating Infectious Material.

Fed viscera of dead fowls on October 11.

	Date of Death.
No. 1	October 12, early in morning.
No. 2	October 13, 5 p.m.
No. 3	October 17.
No. 4	October 13, early in morning.
No. 5	October 12, 1 p.m.
No. 6	October 15, during night.
No. 7	October 13, during night.
No. 8	October 16.
No. 9	October 14, 8 a.m.
No. 10	October 12, 1 p.m.

As each one died an examination of the internal organs was made, and conditions were found identical with cases that contracted the disease naturally. The experiment shows that the disease is very rapidly fatal, a large percentage dying within three days after exposure. The results demonstrate most emphatically the necessity

for the immediate disposal of dead fowls to prevent the infection of other fowls by eating their carcases.

Prevention must be the fundamental idea of all methods of dealing with an infectious disease like fowl cholera. In consequence measures direbted against it must be based upon a knowledge of the ways by which it is naturally spread from one individual to another. The fact that the blood at death teems with the bacteria of fowl cholera signifies that any part of the flesh or entrails is dangerous to other fowls when eaten. This fact was demonstrated in the experiment with the cockerels, all of which died within a week after eating entrails of dead fowls. The occurrence of extensive alterations in the walls of the intestine permits the mixture of blood with the contents of the intestine. Consequently the bacteria of the disease are present in the manure, thus rendering it a most serious factor in the spread of the disease. The probability of this material being mixed with the food by the feet is always to be considered.

Another way by which a sick fowl may spread disease is by means of the liquid that drips from the beak in some cases. As sick fowls are thirsty and frequently drink there is opportunity of contaminating the drinking water. Since all sick fowls are a source of danger to others, their immediate slaughter is imperatively necessary.

The infectious nature of the disease indicated the necessity for thorough and frequent spraying of poultry houses with some substance capable of destroying the bacteria of the disease, and of minimising the number of parasites that might spread the infection. A mixture of crude carbolic and crude sulphuric acids was used for some time, but later the sulphuric acid was replaced by phenolene. It was deemed best to spray all of the poultry houses on the ranch daily, without reference to the distribution of the disease.

A small bucket-spray pump was used to apply the disinfectant. The spraying outfit, together with a barrel of the disinfectant, was moved on a sled from one colony to another. The liquid was sprayed upon the floor, side-walls, and perches of the roosting houses and upon the floor and side-walls up to the nest of the egg houses. The ground was sprayed for several feet around the houses. Especial care was paid to the shady side where the chickens spent considerable time during the day. The infected colonies were all sprayed daily from the 9th to the 15th of October inclusive. All the other colonies were sprayed daily except Sunday.

The mixture finally adopted consisted of one half-gallon each of phenolene and crude carbolic acid to 20 gallons of water. This proved satisfactory, except that it injured the hose somewhat.

The roosting houses were cleaned once a week, and the manure was placed in a part of the ranch where there would be no possibility for it to contribute to the spread of the disease.

When fowls are fed from open troughs, or when the feed is placed directly on the ground, there is a strong probability that the feed may become contaminated from the droppings of sick birds. The practice of feeding from open troughs was discontinued. Troughs were made so as to permit the fowls to reach the head in, but to prevent the feet from coming in contact with the feed.

The practice of slaughtering all hens sick with the cholera was inaugurated promptly; but as the disease was noticeable for only a short time before death many had opportunity to spread infection

before detection. On October 17th it was decided to kill every hen that showed the slightest symptoms of any sort of disease. It was found very desirable to visit the roosting houses at daybreak, for at that time the sick ones are almost certain to be found lingering in the houses. The early visit also permitted the collection of the dead before the living could become infected by eating portions of them. For the purpose of restricting the possibility of fowls becoming infected from the droppings in the houses before the daily spraying it was made the practice to drive out the hens early in the morning, and to shut the doors until after the spraying.

The dead were burned or buried deeply, as convenient. Scrupulous care was exercised to dispose of the dead before the living fowls could molest them.

A number of fowls among those frequenting the vicinity of the house and barns were lost from the cholera. Two turkeys also died within a few hours after they were first noticed to be sick. These birds had abundant opportunity to catch the disease from sick and dead ones brought from the infected colonies. The few fowls about the house were caught and placed with one of the infected colonies.

On October 20th it was deemed necessary to place in the drinking water some substance known to be fatal to the fowl cholera bacteria, and thus insure drinking water free from danger of communicating the disease. It was decided to use corrosive sublimate in the drinking water of the infected colonies, as suggested by Ritzer. That substance is a violent poison to most creatures, and there was some fear that it would have an undesirable effect upon the egg yield, if no worse would result. Stoneware drinking fountains were used, because the corrosive sublimate would have combined chemically with the metal drinking fountains in common use.

Mr. H. O. Woodworth has written the following paragraph, giving information regarding the strength of corrosive sublimate solution used:—

"Corrosive sublimate in the strength of 1 part to 1,000 parts of water (16 tablets to a two-gallon drinking fountain) was used on October 21, but it was observed that the chickens did not drink freely of the mixture. The next day 13 tablets to the two-gallon fountain were used, which mixture the fowls drank more freely. Largely from fear of evil consequences of the use of a strong solution, it was decided to further dilute the corrosive sublimate, using 8 tablets to two gallons of water, or a dilution of 1 to 2,000 parts of water. This strength of solution was supplied to the infected colonies on October 25 and 26. The same was used from October 30 to November 5 inclusive. No injurious effects were noted. A decrease in the egg yield may possibly have been due to its use. A word of caution should be uttered regarding the danger of too free use of corrosive sublimate, on account of its poisonous properties."

Corrosive sublimate was used in the drinking water solely for the purpose of killing any of the bacteria of fowl cholera that might gain access to it, thereby eliminating one of the possible sources of infection. It was not used as a medicinal remedy.

The control of the drinking water of the fowls is a comparatively simple matter in the dry season. An outbreak in wet weather would present much more serious difficulties, for every puddle of water on the ground is more than liable to be contaminated from the

droppings. Under such conditions fowls would catch the disease much more readily.

Work on the ranch under the supervision of the Experiment Station was discontinued on November 5. After this date the disinfection herein described was not carried out. Each time the houses were cleaned the floors were sprinkled with lime. In December about 25 fowls were lost. Occasional deaths after this did not excite alarm until about April 1, when about 50 fowls were lost in a few days among the colonies originally infected six months before. This experience illustrates the danger of relaxing vigilance in dealing with fowl cholera. Any deaths from cholera must be considered alarming, for without repressive measures extensive losses are liable to occur at any time. A mere lowering of the death-rate furnishes no grounds for a feeling of security.

Spread of the Disease.—The spread of the disease across the country has been the subject of some speculation. The evidence indicates that the movement of fowls is one of the important causes of the introduction of the cholera into flocks where it was hitherto unknown. The ranch upon which the station work was done appears to have become infected from an adjoining one where the disease existed, for the trouble first appeared in a colony nearest to the second ranch, and where fowls could readily intermingle. A third ranch, adjacent to both of these, had been stocked with fowls purchased in a locality several miles distant, where cholera was known to have been seriously prevalent.

The cholera and other infectious diseases may exist in a fowl in a sort of inactive, chronic condition, and there is no doubt concerning the agency of such a case in spreading the disease. Thus, fowls not suspected of being diseased may have the disease smouldering among them. The fact that occasionally a single fowl dies of cholera means that a severe loss may occur at any time.

The possible importance of pigeons and wild birds as a means of spreading contagion is worthy of consideration. The fact that pigeons contract the disease and die has been demonstrated. Earlier writers have reported that many different kinds of birds are susceptible to fowl cholera.

The practice of throwing dead fowls by the roadside is an important means of distributing the cholera. When the disease breaks out it is not uncommon for poultrymen to crate their fowls and take them to market. Not infrequently fowls die during the trip to the shipping point and are thrown out by the driver. Should this be done in front of a poultry ranch it is very liable to result in the further spread of the disease, for fowls eagerly eat the dead ones.

An example of the relation of a stream of water to the spread of fowl cholera has come to notice. A poultryman whose fowls had been free from the disease noticed one evening that several dead fowls had drifted ashore from the creek running through his ranch, the next morning the carcases were found stripped to the bone, partly eaten by skunks during the night, and later by chickens from a near-by colony. Eighty-eight fowls in the same colony died during a day and a night. The entire colony was disposed of promptly, but not until one hundred had died. No further trouble was experienced.

Symptoms.—The yellow colour of the droppings is the first noticeable symptom. The yellow material consists of the kidney excretion (urates), which is apt to soil the feathers covering the abdomen, a

condition that should be looked for in suspected cases. Diarrhœa appears later. The character of the dung varies considerably in colour and consistency. Sometimes it is a pasty greenish mass, or a brownish red mucus, or a viscous transparent fluid. The yellow colour of the urates is the most noticeable feature.

The sick fowl gives evidence of its condition by an unnatural attitude of the feathers, and by a disinclination to move about as usual. None were observed to eat during the later stages of sickness. Thirst is frequently present, for fowls were observed to drink copiously in the advanced stages of the disease. A mucous discharge from the mouth was occasionally noticed. Toward the end drowsiness is very marked. The temperature in advanced stages of naturally infected cases varies from 109° to 112° F. (42·8° to 44·4° C.)

Numerous observations on healthy fowls show that the normal temperature of healthy fowls most often lies between 41·7° C. and 42·2° C. A considerable number of apparently healthy fowls exhibited temperatures as high as 42·8° C.

In the majority of cases in which the time of exposure to the disease was known death occurred within three days. The tabulated results of the inoculation of fowls by the ingestion of infectious material show that the incubation period may be as short as eighteen hours in cases infected by natural means. Sickness was seldom noticed more than twenty-four hours previous to death. All the cases that came under the writer's observation were acute. No recoveries were noted. The fact that more deaths occur on the roosts at night than in the day-time was noticeable.

Observations upon the Pathology of Fowl Cholera.

At death, or some hours previous, the comb frequently takes on a dark purple colour, but this does not always occur. Very often the comb is pale and bloodless. The skin of the breast and abdomen is frequently reddened.

In *post-mortem* examinations a congestion of the blood-vessels of the liver, kidney, mesentery, or intestines is noticeable to some degree in all cases. Punctiform hæmorrhages are found upon the heart with almost absolute uniformity. The liver is very frequently marked with punctiform whitish areas of necrosis. Stained sections show these necrotic foci throughout the substance of the liver, and besides reveal a congestion of the blood-vessels of that organ. The next most striking lesions occur in the first and second duodenal flexures. The mucosa is deeply reddened and studded with hæmorrhages varying in size, but seldom exceeding one millimetre in diameter. These involve the intestinal coats to an extent that makes them distinctly visible on the peritoneal surface. The contents of the duodena consist of a pasty mass, more or less thickly intermingled with blood clots. The intestinal contents sometimes consist of a cream-coloured pasty mass, or may be brownish red or even green in colour. Lesions are very rarely observed in other portions of the intestines. The ureters are noticeable in practically all cases by reason of the yellow-coloured urates that they contain. The nasal cavity, pharynx, and oral cavity frequently contain a viscous mucous fluid, probably regurgitated from the crop.

Two turkeys fell victims to the disease. The symptoms and lesions did not differ markedly from those in hens.

Culture media implanted from the liver, spleen, kidneys, and heart blood of fowls and turkeys yielded cultures of a bacterium possessing the characters of the *Bacterium septicæmiæ hemorrhagicæ* group. A description of the organism follows:—

Morphology.—The individual cells are short, non-motile rods, with rounded ends. They usually occur singly, but few are seen in pairs. Spherical forms are numerous in actively growing cultures. The size varies from ·4 to ·6 μ broad, and from 1 to 2 μ long. A bipolar arrangement of the protoplasm is demonstrated when carbol fuchsin and alkaline methylene blue stains are used. The bipolar staining is noticeable frequently in smear preparations from tissues. The presence of a capsule is suggested by an unstained area surrounding each organism when a background of stain is deposited upon the cover glass. The same appearance is noticeable in smear preparations from tissues. The organism retains the stain but faintly when treated after Gram's method.

Animal Inoculation.—Subcutaneous or intravenous injection of fowls with 1 cc. of a 24-hour bouillon culture resulted in death in about 15 hours. Doses as small as 0·05 cc. killed in about three days. A young rabbit inoculated with 0.5 cc. in an ear vein was found dead 14 hours later. A guinea-pig inoculated with 1 cc. *sub cutem* was found dead 14 hours later. A guinea-pig inoculated *sub cutem* survived 36 hours. A pigeon swallowing 1 cc. died in 21 hours, and another receiving 0·12 cc. *sub cutem* was found dead 14 hours later.

Summary.

Fowl cholera has been identified in California. The results of observations and experiments lead to the conclusion that the disease is introduced into the body through food and probably also water infected with the bacteria causing the disease. Fowls eat their dead at every opportunity, which practice must be strictly guarded against during an outbreak. Contamination from the infectious droppings is prevented by disinfecting the roosting-houses daily, and by feeding from troughs designed to prevent fowls from walking in the feed. The same end is favoured by moving infected colonies to fresh ground. Possible infection through the drinking water is prevented by placing a weak solution of corrosive sublimate in the drinking-water fountains. The prompt slaughter and thorough disposal of all sick hens during an outbreak contribute toward preventing the spread of the disease. The evidence goes to show that fowl cholera is a comparatively easy disease to control; but disinfection must be continued after the death-rate becomes insignificant.

The dissemination of the disease in some cases is undoubtedly due to careless disposal of the dead. The movement of sick fowls is of importance in the same connection.

Observations show that it is possible to take new stock on land where the cholera has existed two weeks before, provided the buildings be moved and disinfected. This is confirmed by experiments in the laboratory, which show that sunlight and disinfectants rapidly destroy the bacteria.

THE DIAGNOSIS OF VOLVULUS AND INVAGINATION IN THE OX.

BY M. DETROYE, LIMOGES.

Obstruction of the intestines, either from torsion or invagination, is fairly common in the ox, and its prognosis is always bad, although exceptional cases of spontaneous relief are not unknown, as well as the value of certain treatment, if had recourse to at the commencement.

The following has been proved to be successful if adopted on the first day. Colza oil 1 litre, castor oil 250 grammes, sulphate of eserine 0·20 grammes, to be repeated if necessary, and the animal to be exercised on the side of a steep slope. In this stage, laparotomy through the flank and the relief of the obstruction by operation is indicated, but whatever treatment, medical or surgical, is had recourse to, it must be prompt, as it is useless after the lapse of forty-eight hours and the beast had better be slaughtered. Enterotomy has been advised by certain authorities, but from a practical point of view the results are not satisfactory, and if there is further delay the meat may be spoiled.

Under these circumstances a correct diagnosis is of the highest importance. Many authors have written on this subject, but it is anything but easy to make, even if there was a general consensus of opinion, which there is not, and a young practitioner is likely to be considerably embarrassed. The various symptoms are here considered as to their diagnostic value.

Colic.—This is common to a number of conditions, sub-acute gastritis, enteritis, hæmorrhagic enteritis, acute indigestion of the omasum, acute peritonitis, vesical calculus, and cystitis, and invagination and volvulus. In the last two the attacks of colic are generally at the commencement violent, although sometimes they are altogether absent. They may be so slight as to pass unnoticed, and to be of but short duration. When they are present they partake of the same character as those caused by cystitis from calculus, but examination *per rectum* will differentiate them.

Anorexia and Suspension of Rumination.—These are seen in most cases of serious disease of the intestines. Food and water are altogether refused, and the length of time this condition remains should be taken into consideration.

Constipation, or Torpidity of the Bowels.—This condition is so common as to be valueless.

Passage of Fibro Albuminoid Casts.—Sanguineous mucus with the fæces is an important symptom and does not usually appear before the fourth day.

Change in Position.—This is caused by straddling the limbs apart, and has not the importance that is usually attached to it, as it is seen in indigestion and cystitis. After a period of agitation the patient frequently lies down on the left side, the hind limbs extended and the head thrown round towards his flank.

Straining.—True straining is not often seen. It should not be confounded with the efforts at defæcation that cause relaxation of the sphincter, opening of the anus, and continual raising of the tail, which

only shows that the reflex expulsive action provoked by the obstruction extends as far as the anus and gives rise to the attempt. True straining, with arching of the back and contraction of the abdominal muscles is only seen at the beginning and is not well marked unless the obstruction is situated in the floating colon. If the animal is down, it is sufficient to make it rise up to provoke the act. If standing up, the position will be assumed, if let loose in a yard or field, but only a small quantity of fæces is passed, and the position is only retained for a few moments, but the slightest movement will cause the act to be repeated. When it appears on the first day it is a most valuable symptom.

Manipulation in the Flank.—At the commencement it furnishes no indication, and will be influenced by the condition of the digestive organs. On the second day of the attack there may be slight tension of the flanks, commencing on the right side, but later on extending to the left.

Fever is usually absent, at all events at the commencement of the attack.

Rectal Examination, carefully performed, gives valuable information; even if the invagination or torsion cannot be detected, a sensation of abnormal distention of the intestines will be conveyed to the bowel, especially if the animal will drink. It also permits of cystitis, calculus, and distention or rupture of the bladder to be excluded.

Flatulency.—There is no true flatulency in an obstructed intestine and any noise (*clapotement*) is from fluids accumulated anterior to the stoppage. It must not, however, be confounded with the noise of peritoneal ascites. The noise is heard on the second day, and naturally the degree depends on the quantity of fluid that has been drunk.

Among all these symptoms there are only four that have a real diagnostic value, viz., the passage of mucus or clots, with the more or less complete absence of fæces, ineffectual efforts at defæcation, the recognition of the invagination by rectal or external examination, and the intestinal gurgling.

The symptoms follow each other in due sequence, and give great information; in fact, if they are carefully studied, and a careful examination made, the case can generally be diagnosed on the first, and it should be nearly impossible to make a mistake on the second day.

First Day.—The patient refuses to drink and stops ruminating, suffers from more or less violent attacks of colic, but only small quantities of fæces are passed. The normal condition of the flanks, especially on the left side, will exclude indigestion from the diagnosis, urination and manual exploration will do the same regarding a cystic calculus. The condition of the excrements, and the small quantity passed, might give rise to a suspicion that the case was one of gastro-enteritis, but the peculiar intestinal noises that are so characteristic of this disease are altogether wanting in volvulus or invagination. If there is no colic, and the spasms have ceased, the animal lies down on the left side with the hind limbs extended, and the head turned round to the flank. If made get up, or if let loose, the back is arched as if about to defæcate, and the effort made, but only a small quantity passed.

During the intervals between the paroxysm, manual examination and palpation over the right side, will often enable a painful spot to be located, and internal examination will most likely enable the obstruc-

tion to be detected, if it is at the posterior part of the colon. Auscultation, also, will show that there is mechanical stoppage of the intestine, and a total absence of all sound or movement. If the obstruction is not complete, a gurgling sound that does not shift about, will be heard over the seat of the stoppage.

Second Day.—Appetite completely gone and rumination suspended, little, if any, fæces is passed. There is no colic and the animal continually remains down on his left side with his limbs stretched out. The urine is passed without difficulty, but generally in small quantities, and if the animal made to get up, efforts are made to defæcate that are ineffectual.

Sharp pressure in the right flank will give rise to pain over some particular spot, and palpation will convey a fluctuating, sensation as if fluid had accumulated in the loops of the intestines.

Internal examination usually discloses a swelling that is firm to the touch, sometimes crepitating, and is slightly movable. The pain is indicated by the animal lifting one of his legs sharply or attempting to kick. Even if the obstruction cannot be felt, the feeling of fulness of the intestines will be conveyed to the hand.

If the flank is auscultated there is a complete absence of any sound unless the animal is made move a step, when the gurgling of the fluid in the intestine will be heard. In fact, on the second day, there can be no doubt as to the diagnosis.

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INTERNAL MASSAGE IN THE HORSE IN THE TREATMENT OF TYMPANITIS.

BY M. P. FERRET, V.S., 8TH REGIMENT ARTILLERY.

RECTAL massage with the clenched fist is recommended by Klingberg in the treatment of colic in the horse (Klingberg, "The Diagnosis and Treatment of Colic in the Horse," *Revue Générale de Médecine Vétérinaire*, vol. iv., October 1, 1904, p. 355), acting on the pelvic flexure of the colon and the bladder. The author has utilised this method and in his hands the results have been encouraging.

The first case was about six years ago. Nitrate of pilocarpine, bleeding, enemas, and friction to the abdomen had all been used without effect, and as a last resource rectal massage was employed. The rectum was empty and beyond some tympanitis in the colon, nothing abnormal could be found. The bladder, pelvic curvature of the colon and intestine were massaged for a quarter of an hour, when on withdrawing the arm there was a considerable escape of flatus. The animal, which had been down for an hour, got up, passed some urine-fæces and a large quantity of flatus; in half an hour he was completely relieved.

The author gives a number of cases, but as they are much alike one will be sufficient.

The patient had only been discharged the previous day from the

hospital, having been under treatment for a severe wound on the off knee. She had fed and eaten a quantity of green food which subsequently was found to have fermented. The symptoms were considerable distention, the hollow in the flank being filled up, anxious expression, respiration blowing, violent pain, constantly throwing herself violently on the ground, the pulse was quick, but the facial artery was not distended. Advantage was taken of a calm moment for an internal massage. The rectum was nearly empty, but after about fifteen to twenty minutes a few pellets of fæces were passed into it and flatus escaped. The massage was applied seven or eight times in three-quarters of an hour, and after each application there was a large escape of flatus. The tympanitis subsided in about an hour and the mare had got very much better, she still pawed the ground, but did not roll about. After an hour a further massage was given, again followed by an escape of gas. The patient remained quiet during the night and had no further relapse. M. Ferret remarks that this case is interesting, as only massage was employed. In another case he mentions that he applied internal massage daily to an animal that had suffered from intermittent attack of colic for six days. The large intestine was distended with a mass of ingesta and a small quantity of gas. Each application was followed by an expulsion of a small quantity of flatus and there was considerable improvement, but a cure was not effected till large doses of salines had been given. This instance would appear to show that all cases of overloaded intestines are not accompanied with tympanitis.

In applying internal massage care should be taken that the finger nails are short. The hand is first placed on the floor of the rectum and the bladder manipulated. The arm is then further inserted to the elbow, where it will frequently be found that the last portion of the floating colon is pressing on the hand and may hinder the movement of the fingers, but the rectum very soon dilates and peristaltic movements can usually be distinguished in from fifteen to twenty minutes, followed by the expulsion of flatus, when the hand should be withdrawn for from five to ten minutes. In some cases the expulsion is so violent that prolapse of the rectum is to be feared, when the hand should be withdrawn, placed over the anus and pressure exerted.

Summary.—In colic in the horse the pain is often caused by the abnormal production of gas which can be expelled by internal massage, inducing peristaltis, contraction of the bladder and expulsion of their contents. It is easily carried out, there are no complications to be feared, and it appears to be of service in every-day practice.

(*Revue Générale de Médecine Vétérinaire*, Feb. 1, 1905.)

DENTAL CARIES IN THE HORSE.

BY M. P. LEBLANC, LYONS VETERINARY SCHOOL.

ALTHOUGH commonest in adults, caries of the teeth is seen in animals of any age. In its earlier stages the symptoms are most obscure, but as it progresses the fœtid breath and lesions of the bone leave no room for doubt as to what is the matter.

On account of the pain the food is not properly masticated, and condition is rapidly lost. In such a case the only treatment is removal of the offending tooth, which is done either by "extraction" by special instrument, or "punching" after trephining the upper maxillary bone.

It is not always possible to choose the operation; although, no doubt that, if it is, extraction is the best, but unfortunately it is not practicable in every case, especially in old standing ones, where the crown is brittle, as there is no neck for the forceps to grasp, and the teeth on either side interfere, in such punching must be had recourse to, and the difficulty varies according to the age of the subject and the length of time the case has been going on.

As everyone knows, the growth and wear of the teeth is continuous, and in old animals they are so completely worn down that there are only stumps remaining in the sockets, and in such cases they are easily removed. In young animals, on the contrary, there is the entire fang, which is intimately adherent with the bone, and there is considerably more difficulty.

In old standing cases there is usually periostitis and peridentitis which loosen the fang, and in others the whole tooth is split in two.

In a recent case where there is no ostitis of the maxillary bone, certain anatomical landmarks have to be remembered in making the trephine openings. If the three first molars in the upper jaw are to be operated upon, draw an imaginary line in continuation of the superior maxillary spine towards the nose. An opening directly anterior to the tuberosity at the extremity of the zigoma will expose the root of the third tooth, and one again a little further forward the second. It should, however, be remembered that there are slight variations in different individuals, but they are not so much as to be of any very great importance.

In old-standing cases in which there is an external fistula, this will be a guide.

When the opening is made, as a rule the root of the tooth is not seen, as it is covered with inflamed tissue that easily bleeds, and a guess has to be made where to apply the punch, which is lightly struck with the mallet, varying it in direction. An assistant, with his hand on the diseased tooth, guides the operator, as he can feel by the shock if the punch is on the root of the tooth or not. It is of the greatest importance to have a skilled assistant. After a certain number of blows have been given, varying according to the particular case, the tooth is loosened, and comes away either whole or in parts; but care must be taken to explore the cavity, to ascertain if any fragments are remaining.

When the tooth is removed, an opening communicating with he mouth remains, which particles of food may get into, and which

does not close up for three or four weeks, and therefore the external opening should not be allowed to close up too soon.

The following two cases, one of old standing, the other recent, will serve to illustrate the operation :—

Case 1.—Towards the end of last April the animal, an aged one, was sent for operation to the school. There was a hard bony swelling on the outside of the right anterior maxillary bone, a little in front of the maxillary fissure, and over which the skin was thick and infiltrated, and in the centre of which was a fistula discharging a considerable quantity of fœtid pus. Although lively and healthy, the patient was very thin and in bad condition. The animal was thrown and the mouth examined, when the third upper molar on the right side was found to be diseased, the table being sunk below the others, and having a large circular excavation on it which occupied most of the surface; but as some of the crown still remained above the gum, it was hoped to be possible to extract it with forceps, but this proved a failure, and it was decided to punch the tooth out.

The bone was trephined over the orifice of the fistula, which opened into an irregularly-shaped cavity containing a quantity of fœtid pus. The punch was passed through the opening on to the root of the tooth, which was easily displaced with a few taps with the mallet, and was withdrawn by the assistant, who had his hand in the mouth, in two pieces.

The operation was performed without an anæsthetic; but the patient hardly made any struggle, and it was completed in a very few moments. The case did well, and ended in a perfect cure.

Case 2.—The patient was a four-year-old, recently purchased, that had gradually been falling away in condition and feeding badly, although his appetite remained good and he was able to swallow, and no doubt there was something in the mouth that prevented mastication.

The animal being restive there was some difficulty in examining the mouth, but it was ascertained that the tongue had been cut at some time, and that the molars were irregular. These were rasped level, but there was no fœtid smell, and the maxillary bone was not in any way distorted.

As the case did not improve, the horse was thrown and the mouth again carefully examined, when it was noticed that the table of the upper third molar on the left-hand side was lower than the second and fourth, and in a transverse direction overlapped them; also that there was a small black spot on it that indicated caries. As it was plainly necessary to remove the tooth, and there was no neck to grasp with the forceps, it was decided to punch it, which was done under chloroform.

Considerable force had to be employed, and as the point of the punch kept slipping about on the root of the tooth, which was very firmly fixed in the socket; great care had to be exercised, as there was danger of perforating the palate if it slipped inwards, of fracturing the maxillary bone if outwards, and injuring the second or fourth molars if before or backwards. This was complicated by the hæmorrhage, which was profuse, and prevented the roots of the teeth from being clearly distinguished, and the only guide that the punch was on the right tooth was the indication given to the fingers of the assistant, who kept his hand in the mouth.

The operation was prolonged and difficult, the tooth being removed in pieces, for as there was no periostitis, it was adherent to the bone of the socket for its entire length, which was not worn down, the horse being only four years old. The animal at once began to feed and rapidly regained condition, and the alveolar cavity filled up in three weeks.

Journal de Médicine Vétérinaire.)

ENZOOTIC CHARBON IN THE HORSE AND PREVENTION BY SOBERNHEIM'S METHOD.

BY A. JAEGER.

SOBERNHEIM'S method consists in both active and passive immunisation which gives protection for a year. Serum only gives passive protection unless combined with culture material. Passive protection only lasts for fourteen days, but has the advantage that it can be used anywhere, and that the animals can continue working, whereas with vaccination at least three days rest is necessary.

Three outbreaks of charbon came under the author's observation at Frankfort in which serotherapy was employed. In the first, thirty horses were rendered entirely immune with both serum and virus. Having first ascertained that they are healthy, 10 cc. of a mixture of horse, ox and sheep serum are injected into one side of the neck and ten minutes after 5 cc. of attenuated culture on the other side. Eight of these horses had a slight rise in temperature, which only lasted for five hours; they were none of them attacked with charbon, although the epidemic was raging.

In the second outbreak 200 horses were inoculated with sheep serum only, the dose being 30 grammes. In very few was there any rise in temperature, but in a good many there was an attack of urticaria ten minutes after the injection. Three were attacked with charbon, two a few hours after the injection, and one five days. The inoculation was performed too late in cows in which the disease was in the incubation period. As a remedy the author has used it in several cases of œdema of the larynx caused by charbon, large doses (240 grammes) of mixed serum. There was some improvement, but the cows died. Thinking that the serum which had been kept for some time was weak, he had some fresh from the sheep, but without success. He used it intervenously with the object of acting directly on the blood; in two cases there was immediate improvement. In five cows suffering from the disease he injected 40 grammes of serum into the jugular, in severe ones 80 grammes, in all there was a fall in the temperature and two recovered. In five there was improvement, followed in twenty-four hours by a relapse; a second injection of 40 grammes was given and four recovered. In one case there were six relapses in four days, and 480 grammes of serum were used.

The author considers that sheep serum is the most active, and that the combined system, active and passive, is the best, and as a remedial measure that intravenous injection should be used.

(*Monatshefte für praktische Thierhulkonde*, June 25, 1904, p. 512.)

POISONING IN THE PIG FROM THE *DEBRIS* OF SILK-WORM CULTIVATION.

BY M. JOUET.

In the province of Bas Dauphiné, and all the south-east of France where the silk-worm industry is carried on, a peculiar form of poisoning in the pig from feeding on silk-worm *débris*, accompanied by enteritis and prolapse of the rectum, is well known, but, as far as the author is aware, has not yet been described.

During the season that the silk-worms develop into cocoons, a large quantity of *débris*, chiefly consisting of mulberry leaves on which they have been fed, and excreta remain in the boxes they have been hatched in, and it is a superstition in this region that it stimulates the appetite of the pig and fattens him, a handful being given daily, but frequently the results are disastrous.

In the majority of cases, the pigs had been getting the stuff for about a fortnight. The first symptoms are uneasiness, the animal cannot remain still, but keeps roaming around as if he was aware that there was something amiss. There is great thirst, and he does not feed.

After about the third day ecchymosed patches of an irregular oval shape appear on the back, withers and quarter. They vary in size, but at first they are a bright red colour, changing into violet or dark purple. There is always diarrhœa, and frequently vomiting, followed by constipation, with the characteristic symptoms of inversion of the rectum, which invariably takes place.

Great prostration then sets in, the pig is dull and depressed, he hides in the litter, and shows his pain and distress by grunting if any one comes near him.

The prognosis is bad if the case is neglected, but if taken in time, and prompt assistance given, the majority do well.

The first thing is to reduce the prolapsus. The part should be bathed with cold water, a little vaseline applied, and usually it can be easily reduced and kept in its place with a suture.

The patient should be kept on slops, and an enema of some bland fluid such as gum and water or oil given. He should be given but little food for the first four or five days, and that should be soft. Most cases recover and do well.

(*Journal de Médecine Vétérinaire de Lyon*, May, 1903, p. 282.)

NOTES ON SPAVIN.

BY VOGT.

The animal, which had been affected for two years and a half with tarsal osteo-arthritis, died from colic. A *post-mortem* examination was made, which throws some light on the evolution and treatment of spavin.

In addition to lameness, which disappeared with a subcutaneous injection of cocaine over the crown of the nerves, the absence of any local symptoms pointed to spavin.

The part was blistered and two months rest given, when the horse

worked for about two months, after which the lameness reappeared worse than before.

Hoffmann's system of pyro-puncture was then applied in ten points, penetrating to the bone, and rest given for a fortnight, when the animal was so much better that he was again put to work.

The relief, however, was not permanent, and he was only employed at intervals up to the date of death, about twenty-three months after the operation.

On examining the hock the black marks of the cautery could be seen in the articular ligaments, but after boiling not a trace of them could be seen on the bone.

The scaphoid and large cuneiform were completely anchylosed in front. All the bones of the back showed the well-known lesion of osteo-arthritis and anchylosis, commencing from a central point and extending towards the outer and external part of the joint.

The interesting features of this case are the black or brown spots in the ligaments caused by oxide of iron from the needle, and also that, although the cautery was deep, it had had no effect at all on the bones.

(*Deutsche tierarztliche Wochenschrift*, May 14, 1904, page 191.)

THE ABUSE OF ARTIFICIAL SELECTION.

BY C. J. DAVIES.

We were consulted some time ago by a friend as to what variety of fancy pigeon we would advise him to "go in" for. One of the chief qualifications insisted upon was that the birds must be hardy and capable of taking care of themselves, at the same time possessing some of the most ornamental and pleasing arrangements of colours and feathers. At first sight a selection seems easy enough when we recall to mind the rows upon rows of pens, totalling into several hundreds, and containing many different varieties, to be seen at the Crystal Palace or any of the leading shows. Among no other animals, perhaps, has the fancier been so busy, or made so many new breeds, as among pigeons, and nowhere can we find a better object lesson, nowhere can we more conveniently study *unnatural* history than at a pigeon show. The secret, perhaps, lies in the numbers bred. Equal advances could, no doubt, be made in any other animal if bred in sufficient numbers, and if the breeder had any incentive to cultivate curious variations. However, to return to the main point, the first difficulty with which we were confronted was the problem, What breeds of pigeons of modern type *were* able to take care of themselves? When we came to go into the matter we found that all the prettiest varieties, and hence all those which have been most assiduously cultivated by the fancier, have been bred up to such a standard that they are no longer able to propagate their kind without man's assistance.

For instance, the short-faced tumblers are now bred with beaks so short that the young bird is quite unable to break its way out of the shell, and will therefore perish unless assisted out by its owner.

In the case of the turbit—one of the most charming of all the breeds—so great has the rage for parrot-like beaks become that "improved" birds are unable to feed their young. Indeed, this special natural adaptation of feeding the young has been lost or become impossible in a large proportion of the modern breeds, and it is the usual thing for the fancier to place the eggs of his choice birds beneath common pigeons, and to employ several pairs of the latter in succession to rear one pair of alien young.

Then we find pigeons with such an arrangement of feathering as practically amounts in appearance to a pair of wings on their legs, which not only inconveniences the birds, but is also apt to lead indirectly to a number of ailments and misfortunes. Over the long legs and abnormally developed crop of the pouter, with its attendant disorders, we will not linger, but will pass on to the fantail, which perhaps, of all others, is the most highly specialised variety. Not only has the whole skeleton of the bird changed, but instead of the normal twelve we find in some specimens as many as forty feathers in the tail. This enormous increase of the feathers has led to the abortion of the oil-gland and to other peculiarities. Furthermore, *the birds cannot, as a rule, breed unless their tails are cut off.* Presumably the multiplication of the normal number of tail feathers would lead to the upright or "fan" arrangement as a natural correlation, as only in this way can room for the enormously increased number of feathers be found; but we see that it is acquired at the expense of the oil-gland which exists in all other breeds of pigeons, and indeed in nearly all birds, and that the birds could not breed if left to take care of themselves.

If we turn to modern dogs, we find certain abuses of the art of artificial selection creeping in here also, as the result of the incentive given to the production of purely fancy as opposed to utility animals. Among the most popular breeds at present are the various "toys," dwarfed and stunted specimens of larger breeds which have been developed into sub-breeds, and among which, broadly speaking, the most diminutive specimens are the most valuable and highly prized. The difficulty in breeding these very small animals lies in the fact that the very smallest bitches are unable, as a rule, to procreate their kind. An attempt to breed from them leads almost invariably to their death, therefore breeders are obliged to send comparatively large bitches to diminutive dogs, and this one-sided arrangement leads to the production of a very small proportion of individuals of diminutive size. Of late the terrible practice has arisen of breeding from diminutive bitches and *deliberately sacrificing them.*

Among bull-dogs, again, the fancier is overstepping the bounds of common sense and humanity. Fashion, or the standard, or some equally inadequate authority, decrees that the typical bull-dog should possess a certain conformation of body, loin and hind-quarters, known as a "roach back," combined with an abnormally big round skull; in fact, the fore-part and the hind-part of these dogs are so ill-balanced that they practically belong to two animals, and the creature is nothing more or less than a monstrosity. Now the particular body formation so much sought after entails a certain shape of pelvis which precludes the possibility of safely breeding these big-headed puppies from a bitch so formed. In the past fanciers were content to breed from bitches with what they considered "bad" bodies, being satisfied with

a small proportion of puppies with the roach back inherited from one side only. Of late, however, this is not considered enough, and here again cases are on record of resort to the Cæsarean operation after breeding from a "typical" bitch.

We mention these things because, although matters have not, as far as we know, yet reached such a pitch that farmers and practical men will deliberately breed from a female knowing that to do so will cause her death, yet there are signs that certain abuses, which are certainly not calculated to be of ultimate benefit to the races of animals on which they are practised, are creeping in. We allude particularly to artificial insemination.

The advocates of the system quite overlook the *subsequent* results. Some of the commonest causes of sterility are such defects as flexion; constriction or rigidity of the cervix or neck of the uterus; the formation of false membranes, want of muscular power; abnormal construction or size of the cervix, and many others. All these peculiarities are undoubtedly hereditary, and by artificially getting progeny from animals so formed, we are, like the breeders of fantail pigeons, leading to the propagation and transmission of peculiarities which will ultimately tend to the extermination of the variety when the hand of man is withdrawn. If the practice becomes at all common among any one variety of horses, for instance, it will not take long for it to become widespread through the whole breed. Every stallion so produced will be liable to hand on the defect of his mother to a large proportion of his progeny, and if mated with a mare which owed its origin to artificial insemination, the defective organs will certainly be reproduced in the progeny. Soon the whole breed will contract the taint, until by unconscious inbreeding to it the entire race will become incapable of reproduction by natural means.

The fact that defective animals have in the past been incapable of breeding has been the great safeguard of breeders; now that science has introduced "improved" methods and has dodged nature, so to speak, there is no knowing what the ultimate result will be unless breeders will be warned and will absolutely decline to have anything to do with these operations of more than doubtful advantage. The warning is of particular importance at the present time when our animals are being more and more bred for "fancy" points, and when competition is so exceedingly keen. Breeders will see by the few examples we gave among pigeons and dogs that there is apparently no limit to variation, and that it is in their hands alone to control it when it bids fair to exceed reasonable limits. Shows are, of course, responsible for a lot of the mischief. The valuable prizes which can be won on the racecourse and at exhibitions by animals which possess certain characteristics, and the enormous sums which are given for individuals capable of winning some of these honours, has so stimulated competition that men stop at nothing in their efforts to produce an animal which possesses certain characteristics in a more exaggerated degree than any hitherto produced: hence we are year by year acquiring races of more and more useless animals; and unless some general check arises, it will not be long before it will be the exception to find any of them which will breed naturally and without man's aid. Fault lies, also, in the standards set up by man to breed to. These standards are practically unlimited and allow of any desirable point being exaggerated until it becomes a monstrosity. In the past this

regulated itself because monstrous animals failed to breed, and the variation was therefore not propagated. Now all is changed, and we find ways of artificially causing the reproduction of all manner of undesirable characteristics with dire results for the future.

It may be advisable to touch upon the more far-reaching effects which will ultimately accrue from unnatural methods of breeding. At the present time our breeds of animals stand pre-eminent and our stock is exported to every part of the world to improve indigenous varieties. That purchasers come again is proof that our animals give satisfaction. Furthermore, our highest prices come from foreigners, and the exorbitant sums which are given for a stallion, a bull, a ram, or a dog are unhesitatingly paid for animals which they consider suited to their purpose. These fancy prices have no doubt stimulated breeders to renewed efforts, and it is partly the thought of a possible thousand pounds being forthcoming from America for a typical bull-dog which has led to the abominable methods of production which we have hinted at. Breeders, however, will destroy their best markets in the next decade if they do not realise the danger of what they are doing.

Those South American breeders, for instance, who now willingly give thousands of pounds for a bull to improve the stock on their ranches, will not be so delighted with their bargain if they find that, owing to our advanced and improved methods of production, a large proportion of the females sired by this bull are sterile, or in other words, incapable of breeding naturally. There is enough sterility among inbred stock as it is, without our deliberately making it into a hereditary characteristic by artificially causing these malformed individuals to reproduce. We shall, therefore, soon lose our best customers if we supply at exorbitant sums, or indeed at any price, individuals which are hereditarily imperfect in their reproductive powers, and which will consequently transmit the peculiarity to the animals they are procured to "improve," and which owing to their being kept in a half-wild state cannot receive assistance from man. Obviously the taint will not spread far in these countries, simply because the affected females will not reproduce, and will therefore leave no descendants; but, nevertheless, our market will be spoilt for many years to come.

If these practices spread much in this country, too, we shall in a few years feel the effect. As dogs are purely fancy and no longer utility animals, and as we may expect to find that the horse has reached a similar position in the course of the next half century, their degeneration will not be acutely felt by the country at large. With cattle, sheep and pigs, however, it is different, for on them we depend for a portion of our food supply. It is unlikely that farmers, who are essentially practical men, will ever resort as a body to artificial methods of reproduction, but they may still be the sufferers. It is the big breeders of show stock who are the chief culprits at present, and it is to them that the farmers occasionally go to get animals wherewith to improve their own. If they have the misfortune to acquire individuals which have not been produced naturally the obvious sequel is that their own stock will become afflicted with the hereditary fault—whatever it may be—and that for a time, at any rate until matters have naturally readjusted themselves, there will be a dearth of home-bred animals in the markets of the country. In other words, a few

male animals, the products of necessary artificial insemination, spread about the country, may leave their hundreds of descendants before the evil or its cause is suspected, and will lead not only to a severe temporary reduction of our herds, but to another check to a most important industry which is already in none too flourishing a condition.

(*The Estate Magazine.*)

Reviews.

VETERINARY DOSES AND PRESCRIPTION WRITING. By PIERRE A. FISH, D.Sc., D.V.M., Professor of Veterinary Pharmacology, Cornell University. Published by the Author, Ithaca, New York. 1905. Price 1 dollar.

This little work of 150 pages is intended by the author to be of use to the student during his college course, and also when he becomes a practitioner. The doses are conveniently arranged so that they show the comparison between the Apothecaries' tables and the Metric system, and include those for all animals. Many drugs which are apparently in general use in America and which are not in every-day use in England are included. There is a table of therapeutic terms, a chapter on prescription writing which gives many very useful hints, and a chapter on the principles of combining drugs in a compatible manner. The drugs themselves are treated briefly and several pages are devoted to poisons and their antidotes.

Although rather American in its phraseology, the book distinctly fills a gap in English veterinary literature. It is neatly got up and of a convenient size for handy reference.

THE HARNESS HORSE. By Sir WALTER GILBEY, Bart. 4th edition. Published by Vinton and Co. Price 2s.

When a book has reached its fourth edition in a very short time it is a positive proof that it must have met with the approval of the public. In this small work of some 60 pages there is to be found very much of practical interest, and we can commend it to those of our readers whose lives are thrown in towns or districts where carriage horses form the bulk of their patients. In the preface Sir Walter Gilbey draws attention to the desirability of breeding horses for harness, in order that we may render ourselves less dependent upon foreign sources. He draws attention to the fact that it is common for us in England to breed horses for racing and riding, so that we have had to depend almost entirely upon continental breeders for our high-class harness horses. He also states that since the spring shows in London there has been at all the Agricultural Societies' shows an unusually brisk trade in horses, including horses for harness. This fact would seem to furnish an answer to the assertion so often made, that the motor-car will supersede the carriage drawn by one horse or a pair.

NON-SPORTING DOGS: THEIR POINTS AND MANAGEMENT IN HEALTH AND DISEASE. By FRANK TOWNEND BARTON, M.R.C.V.S. Published by Everett and Co., London.

This little book of 250 pages is evidently intended solely for the members of the canine public, and it consists mainly of a reprint of the rules and regulations of the various clubs to which the non-sporting dogs belong. The illustrations have not come out as clearly as they might have done, and the chapter on kennels and their management appears somewhat in the light of an advertisement for one particular firm. The portion which deals with canine medicine and surgery is rightly described as "elements" of the former, and "rudiments" of the latter. They certainly do not give much information by which the amateur could in any way rival the professional man. Some of the views are decidedly elementary and quaint.

ADVICE TO PURCHASERS OF HORSES. By Dr. P. GOLDBECK, Principal Veterinary Surgeon of the 5th Regiment of Artillery, Podbrelski, 1st Siberian Borg; vol. 1, 166 pages; 10 drawings from photogravure; 1905. Price 2.73 marks. Published by Ernest Siegfried. Mittler and Sons, Libraire de la Cour Royale, 68 to 71, Kochstrasse, Berlin.

Everyone knows that it is desirable if not indispensable when buying a horse to have the advice of an experienced veterinary surgeon who is a horseman and can ride and drive, but this is not always possible, and in such cases the purchaser must rely on his own judgment. We do not for an instant say that the study of a work like that under review will make an ignorant person an experienced horse-master, but it may show him some of the pitfalls that beset his path. Young veterinary surgeons and horsemen will find in this little book many hints that will be useful, and the author has given his personal experience. The book contains six chapters.

Chapter I. deals with the customs in general of the horse trade. The author is of opinion that, in spite of mechanical traction and motors, the demand for horses is as great as ever, and that there is no falling off in price. He reviews briefly the cause of this, and mentions the class of horse most in demand, giving photographs of them.

In the second chapter he deals more especially with the horse-breeding industry of Germany, giving statistics of numbers of young stock, importations, and equine population of the various States of the German Confederation.

Chapters III. and IV. are the most important, and treat of the points of the horse.

Chapter V. gives regulations in Germany and other countries as to unsoundness in horses.

In chapter VI. are described some special points relating to the horse trade in Germany, particularly as regards buyer and seller and tricks of horse copers, and finishes with an alphabetical table explaining the technical terms used.

The little book is well got up and the photographs well done. The publishers have spared no pains with it.

We have received a somewhat unusual and remarkable work for review by the last Indian mail—viz., "A Text-Book on Veterinary Jurisprudence in Ordu," by "Khan Sahib," Syed, Sirdar Shah Gilani, House Surgeon and Professor of Bovine Medicine and Surgery, Punjab Veterinary College, Jahore, India.

It is scarcely recognised in England to what an extent veterinary education has advanced in India during the past twenty years, and, indeed, we have no hesitation in saying that in certain practical branches the facilities for teaching are far superior in India to what they are in England.

The want of text-books in the vernacular was a want that was felt for a long time, but the difficulty has been got over by the compilation of a series by the teachers at the Punjab Veterinary College. Syed Sirdar Shah appears to have been a prolific author, and has produced books on a variety of subjects, all in the vernacular, of which we give a list:—

(1) A Text-book on Veterinary Obstetrics.
(2) A Text-book on Bovine Pathology.
(3) A Text-book on Handling of Domestic Animals.
(4) Cattle Diseases in India.
(5) Diseases of the Dog.
(6) Camel Keeping in India.
(7) Milk and Meat Inspection.
(8) Dustur-ul-Ilaj aspan (Veterinary Medicine).
(9) Dustur-ul-amal Tazidari (Practical Horse-keeping and Breeding).
(10) Operative Veterinary Surgery.
(11) Veterinary Jurisprudence.
(12) Indigenous Drugs (in the press).

The amount of labour expended must be enormous, especially when it is remembered that a vernacular equivalent for every scientific term has to be found, which of itself is a gigantic task, as the Hindustani language does not readily lend itself to such, and the author has been on occasion driven to fall back on the Eastern classics, viz., Persian and Arabic, for a substitute.

The work on the "Diseases of the Dog" is an extremely useful one, and the first of its sort published. Most high-class native gentlemen are sportsmen, and keep dogs, and the book is written in clear language devoid of technicalities. It is divided into six chapters, and a number of illustrations in the text. The author treats of the injuries of the dog, with the various contagious and other diseases, such as rabies, distemper, and mange, to which the animal is liable. The chapter on rabies is particularly valuable, especially the exposure of the popular fallacy that if a person is bitten it is essential that the dog be at once destroyed.

Distemper and mange—two most troublesome diseases in India—are fully described; also there are some valuable hints on the care of dogs imported from Europe or Australia.

The work on Bovine Diseases is compiled from standard European works, together with the author's personal observations, which, from his position as Professor of Bovine Pathology at the largest school in India, he is in a singularly favourable position to make.

We consider that the greatest credit is due to Syed Sirdar Shah Gilani, and trust that his indefatigable industry will receive some recognition from the hands of the Indian Government.

Correspondence.

PEAT MOSS LITTER.

To the Editor of THE VETERINARY JOURNAL.

SIR,—Having read the article in the January number of THE VETERINARY JOURNAL on peat moss, by Colonel Nunn, and having had a fair amount of experience with it, I would like to make the following few remarks:—

(1) The success or non-success of its use entirely depends on its being properly treated in an intelligent manner. Grooms generally are most conservative in their ideas, and dislike any new introductions. They much prefer to go on as their forefathers did before them, and whatever notions of stable management they may have learnt at the commencement of their career remain deeply rooted in their minds, and it is only with great difficulty and constant supervision that they can be made to alter their methods. Consequently any comparatively recent changes that have been adopted or discoveries made are regarded by them with disfavour, and if left to themselves they do not give them a fair trial.

(2) There can be no two opinions on it being cheaper than straw beading, always provided it is judiciously treated. I have found with care that one can do quite well on an allowance of 4 lbs. per diem for each horse, but with an extra 2 lbs. to cover undue waste on the part of the groom one can easily keep a good bed going, so that even if peat moss were weight for weight as expensive as straw there would be a saving, but as it is less expensive the economy is proportionately increased.

(3) In a stable with a large number of horses, such as a military one, the comfort in lessening noise is great if it is kept constantly under the horses' feet, which can be done where peat moss is used, as the floors remain dry, and it does not require the constant airing which is so necessary with straw litter.

(4) In private stables, where it is almost impossible to persuade the average grooms to allow proper ventilation, its property of absorbing ammonia keeps the place sweet.

(5) Its high absorbent properties keep the floors dry, which is a great advantage, especially if they are not of the best, and grooms do not resort to the pernicious practice of washing the floors and leaving the horses standing on them before they are dry a custom which is a fruitful source of coughs, colds, and fever.

In addition to the above remarks, I may add that I have found that when horses suffer from atrophied frogs, the springy nature of the peat moss affords the pressure necessary for their healthy development, and provided the feet are properly looked after they improve much more rapidly than on other bedding.

Yours faithfully,

E. W. LARNDER, Major, A.V.D.

March 23, 1905.

THE MEMORIAL ERECTED AT WORCESTER, SOUTH AFRICA, TO THE LATE MR. JOHN PARKER.

To the Editor,

SIR,—Will you grant the privilege of an announcement being made in the pages of THE VETERINARY JOURNAL of the completion of the memorial erected to the memory of the late John Parker, C.V.S., attached to the Army Veterinary Department.

A statement of accounts and a photograph of the memorial has been forwarded to each subscriber.

From this it will be seen that the surplus of £2 16s. 4d. has been forwarded to the Officers' Orphans' and Widows' Fund.

Yours faithfully,

F. W. WILSON, Capt., A.V.D.,
Hon. Sec. and Treasurer.

Edinburgh, February 28, 1905.

Books and Periodicals, &c., Received.

Fortschritte der Veterinär Hygiene, December, 1904; Bulletin Vétérinaire, December, 1904; Revista de Medicina Veterinaria, December, 1904; Deutsche Tierarztliche Wochenschrift, December, 1904; Berliner Tierarztliche Wochenschrift, December, 1904; Revue Générale de Médecine Vétérinaire; Johns Hopkins Hospital Bulletin; Recueil de Médicine Vétérinaire; l'Echo Vétérinaire; Il Nouvo Ercolani; Clinica Vétérinaira; Le Mois Scientifique; American Veterinary Review; Twentieth Report of the Bureau of Animal Industry, 1903, Department of Agriculture, Washington, U.S.A.

Communications Received.

Captain Anthony; Lieut. Tyson; Major E. Taylor; J. Brodie Cresswell, Esq.; Captain McDougall; Captain Briscoe Knight; James Clark, Cupar-Angus, N.B.; J. G. Thomas, Chichester; Professor F. Hobday; Wallis Hoare, Cork; P. Vincent, Grays; Major H. Pease, Lahore; Captain A. Smith, Lahore; P. Connolly, London; J. Varney, Winslow, Bucks; Granville Haskill, Ipswich.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements), should be addressed to the Editor.

Manuscript—preferably type-written—should be on one side only of paper, marked with full name of author.

Illustrations for reproduction should be in good black or dark brown on white paper or card.

Advertisements and all business matters relating to the JOURNAL should be addressed to the publishers, Messrs. Baillière, Tindall and Cox.

All authors desiring reprints of their articles will be supplied with copies free of charge upon requesting same within a week of publication of the JOURNAL.

THE LATE COLONEL J. DRUMMOND LAMBERT, C.B., F.R.C.V.S.